A MANUAL TO IMPROVE EFFICIENCY IN CONTRACTOR-SUPPLIED QUALITY CONTROL ON ASPHALT HEAVY CIVIL CONSTRUCTION PROJECTS ON STATE OF ALASKA-OWNED ROADS

A

PROJECT

Presented to the Faculty

of the University of Alaska Anchorage

in Partial Fulfillment of the Requirements

for the Degree of

MASTER OF SCIENCE

By

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Anchorage, Alaska

May 2015

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A Manual to Improve Efficiency in Contractor-Supplied Quality Control on Asphalt Heavy Civil Construction Projects on State of Alaska-Owned Roads

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Abstract

The State of Alaska requires contractors to follow specific quality standards for heavy civil asphalt construction projects. Contractors face financial and scheduling risks if these standards are not addressed effectively and in conformance with necessary criteria. Contractors must complete project work to meet customer requirements and conform to quality standards efficiently and cost effectively. Doing so ensures that the State of Alaska's quality standards are met and contractors' financial and schedule targets can be achieved with the most efficient use of scarce resources. Currently, there is an indirect cost savings to the contractor to perform QC in a specific manner because it reduces or in some cases eliminates rework. The desired state is to directly save money by applying efficient quality control methods.

This project produced a manual that describes best practices and quality control procedures that can be applied by heavy civil asphalt construction contractors to meet necessary SOA quality standards in a more timely, cost effective and efficient way. The correct application of this manual should result in a savings of 1% on the bid cost per asphalt ton.

Key Words: State of Alaska, quality control, Asphalt Construction, Asphalt Contractors, Quality Standards, heavy civil construction project

Table of Contents

List of Figures

List of Tables

Introduction

Executive Summary

Asphalt is the most expensive line item in a civil bid. Asphalt is what the public eye sees and feels when they drive a new road. The taxpayers who ultimately support the majority of the cost for the roads and airports to be paved need to feel confident their money is spent well.

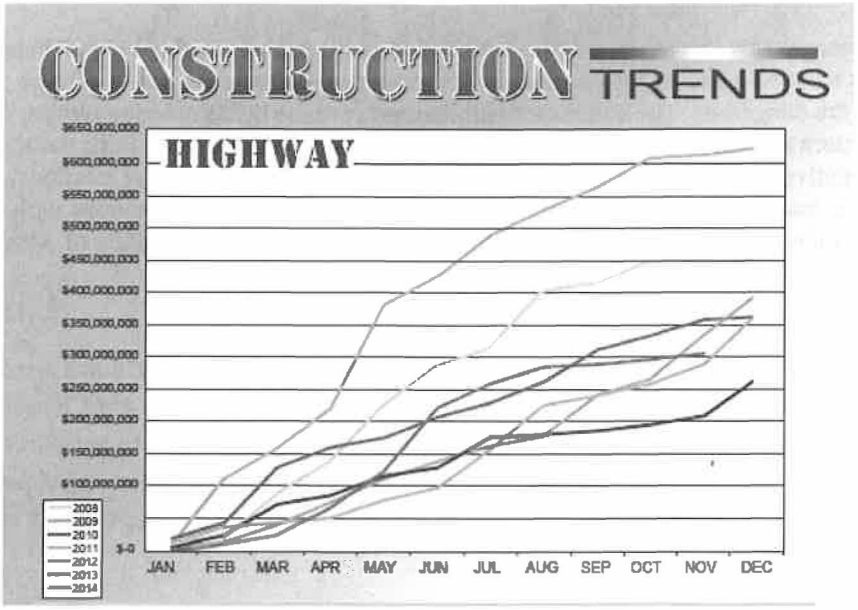

Figure 1: Dollars Spent on Highway Construction (Source: The Alaska Contractor, Winter 2015, p8)

The owner, in this case the State of Alaska DOT, is held responsible for spending the allocated money wisely. If a contractor cannot produce an asphalt product worthy of taxpayer's money, they will not get paid. The amount of money spent on highway construction for a period of one year, over the last seven years has ranged from $275k to $625k. Figure 1 shows this trend beginning in 2008 and finishing in 2014. Not all allotted money to highway construction is directly paid by taxpayers, but a large portion is funded through tax money. Considering the amount of funding the State of Alaska spends on roads, the quality of the product is high on the list of importance for the State of Alaska. With asphalt currently costing the contractor about $100 per ton and an average paving project consisting of 30,000 tons, the contractor must produce a quality road or airport for the State of Alaska.

Each road or airport requires constant monitoring by the State of Alaska to keep each system functional and safe for all users. In order to maximize the efforts of all pavement preservation services, the State of Alaska implemented the quality control system (Al-Keet, 2002). Therefore conducting contractor quality control is the most efficient way to ensure the contractor produces an asphalt product worthy to the State of Alaska DOT. This method is beneficial to both the contractor and the State of Alaska. The contractor saves time in the preconstruction phase by raising their confidence level of the final product and money in the construction phase by minimizing or reducing rework. The State of Alaska benefits from quality control by receiving a better product and demonstrating to the taxpayers how their money is protected.

Quality control, in general terms, is the act of ensuring a quality product will be delivered as an end result. In terms of asphalt, quality control is of high importance because a large sum of money is on the line for the contractor. Asphalt is more difficult to monitor than other materials used on projects because it is a blend of aggregates, sand and oil. Ensuring the blend is perfectly aligned with the specifications is where quality control becomes a difficult matter. The difficulties contractors face with asphalt quality control is ongoing and is creating an inefficient system. Each project results in a different method to monitor the asphalt. Multiple methods and an accelerated summer schedule in Alaska are aggravating the current effects of the inefficient system.

The project manager saw this as a need for stabilization in the asphalt quality control industry. Improvements must be made by the contractor. The repercussions of continual mediocre quality control to the contractor are dangerous. The contractor will lose net revenue by completing rework on their own dollar, hiring more employees to monitor the lengthened project and possibly push the schedule back of the next consecutive project. The contractor must also have a continual trusting relationship with the State of Alaska. If the quality control is not applied correctly and efficiently, the relations with the State of Alaska will dwindle and the possibility of procuring future projects with the State of Alaska will be in jeopardy.

Project Purpose

Asphalt Quality Control plays a vital role in the final satisfaction of the owner. Each phase of a project has its own unique asphalt quality control requirements: Initiation, Execution and Closeout. In order to create an environment conducive to excellent quality control, all phases need to be addressed. Currently, the industry focuses heavily on the execution phase and disregards the initiation and closeout phase. Without effective and efficient quality control, it is unlikely a project will be completed on time and on budget.

This project was initiated in order to increase the efficiency of contractor-supplied quality control measures on asphalt based State of Alaska civil construction projects. The project manager for this project, Alena Robson, had full authority as granted by the sponsor, Amanda Gilliland, to utilize any needed time to complete the project.

In order to accomplish the project goal of increasing the overall efficiency of quality control for contractors, the project manager produced a manual that will be available to all stakeholders. The manual ultimately aimed at bridging the gap between budget control and production. Figure 2 demonstrates how quality control is the link between the contractor's budget and production during the life of the project. The manual primarily focuses on improving the efficiency of asphalt quality control methods during preconstruction, execution and closeout of road projects.

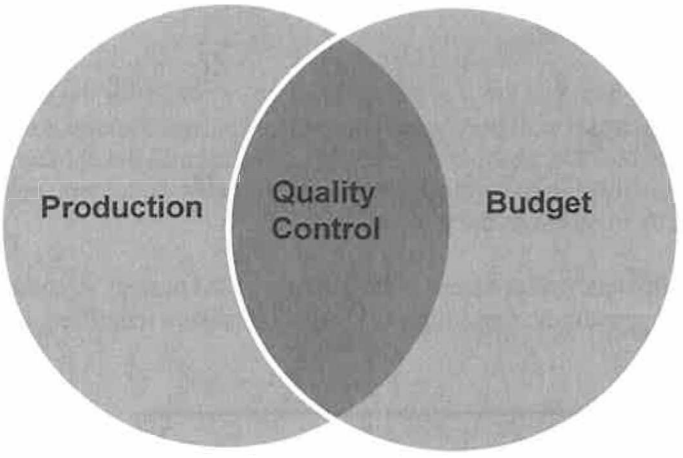

Figure 2: Quality Control Venn Diagram (Source: Alena Robson)

Research Question

Based on initial background research the need for improvement on asphalt quality control was established. The project manager defined the following research question:

What are the methods to effectively and efficiently improve contractor-supplied quality control measures on asphalt heavy civil construction projects in the State of Alaska?

Project Objective

In order to complete the manual, two sets of goals were identified: Business Goal and Project Goal.

The business goal of this project was to increase the overall efficiency of contractor quality control in an effort to minimize rework and in turn improve the net revenue for contractors. Accomplishment of this goal would result in a cost reduction to the State of Alaska.

Objectives:
Minimize financial and schedule risks to contractor
Define specific improvements in the quality control methods
Increase cost savings on asphalt by 1% for contractor

The project goal was to complete a manual for asphalt contractors to utilize on State of Alaska projects by May 2015. Use of the manual by contractors will provide the opportunity to decrease rework of ongoing and future paving projects, in turn increasing overall project net revenue for the contractor.

Objectives:
Write a fully scoped Project Management Plan to be used for execution
Present finalized Project Management Plan to key stakeholders for approval
Collect relevant data through 12 high-quality interviews
Properly execute and monitor KPIs to keep project status at "green"

Research Methods

Stakeholder Identification

The research for this project included input of all stakeholders. In order for the project scope to be properly formed, incorporation of end users was appropriate. The stakeholders for the project were identified in two ways: internal and external stakeholders. The internal stakeholders, regardless of their influence, were directly involved in the project lifecycle. External stakeholders, regardless of their influence, were not directly involved in the project lifecycle.

Identifying the key stakeholders was pertinent to the success of the project. A complete list of identified Stakeholders is listed in Appendix A. Once the key stakeholders were identified, their power to interest ratio was graphed.

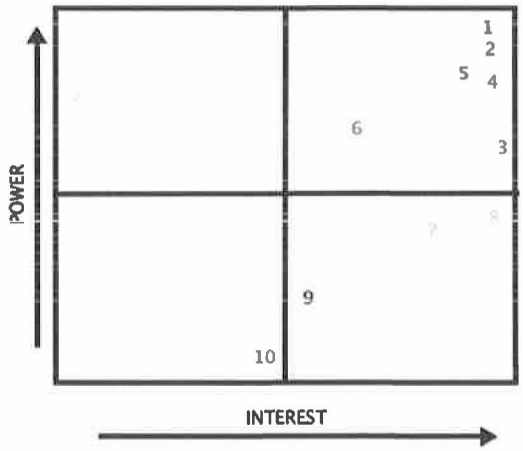

Figure 3: Stakeholder Power Interest Grid (Source: Alena Robson)

Figure 3 shows the distribution of stakeholders with regard to power and interest which play a large role in stakeholder identification and management. Those stakeholders who demonstrated high power and high interest were sought during the project planning phase to aid in formulating the project scope statement.

Project Scope

After stakeholders were identified and categorized, the project manager crafted the project scope statement that incorporated the needs of the project sponsor and stakeholders.
The scope statement for the project was:

The project will produce two deliverables: 1. a project management plan that details exactly how the project will be executed and 2. a quality control manual for heavy civil contractors to utilize when completing asphalt projects for the State of Alaska. The manual produced will be approximately 20 pages in length and cover the current method used for effective quality control on State of Alaska asphalt projects, as well as the recommend most efficient contractor quality control measures to use on SOA asphalt projects. The data for this manual will come from interviews with relevant sources and self-

conducted literature reviews. The project will be constrained by schedule. It shall begin on September 4th, 2014 and be completed on April 20th, 2015.
Assumptions to the scope are:

- All committee members will communicate in a timely fashion
- The IRB will accept project research methods

Exclusions to the scope are:

- The manual will not be an instruction manual on how to conduct asphalt quality control testing procedures.
- This project does not include a training program on the use of the manual or a hand-off document.
- There will not be a real world test performed by the project manager on the effectiveness of the manual

Research Approach

Before research began, the project manager compiled a submittal package for the Institutional Review Board (IRB) to review and approve. The research for the project consisted of both interviews with subject matter experts (SME) and literature review for raw data support.

Interviews

The project manager gathered a list of SME who would complete interviews. The list of interview sources was compiled in two ways. First the project manager looked at who would directly use the manual. This included contractor representatives who work in the contractor quality control department and other contractor's representatives who understood the importance of asphalt quality control. Second, the project manager identified those who would be indirectly affected by the manual. These sources include State of Alaska employees, consultants who represent the State of Alaska and others who work directly in the Quality Assurance department of either the consulting firm or the State of Alaska- Department of Transportation (DOT). All interviewees signed a consent form before the interview date. The interviews were conducted via phone and all transcripts were digitally stored. Interviewees consisted of:

5 Contractor representatives
3 Consultant representatives
3 State of Alaska representatives

The project manager had an initial goal of twelve interviews, but due to time constraints the project manager conducted eleven interviews with SME. Eleven completed interviews were sufficient to complete the data analysis needed for the manual. The questions presented to the SME depended upon the type of construction representative the project manager interviewed. Contractor, consultant and State of Alaska representatives each answered a different set of questions relevant to their sector. Regardless of representative type, all SMEs were asked about the current methods used in the field, where improvements should be made and the effectiveness of each method both current and suggested.

After the interviews were complete, all transcripts were coded. The project manager divided the transcripts into the three phases of a typical construction project: Preconstruction, Execution and Closeout. From there, the transcripts were divided up further by looking at common themes among each phase of a construction project. The frequency, defined as a number of times each theme was mentioned by the interviewee group, was graphed as well as the mean response for effectiveness of the quality control theme.

Literature Review

The literature review for the project targeted technical writings and other manuals as well as academic journals. The project manager primarily focused on the following publications:

Alaska Standard Specifications for Highway Construction Manual
Western Alliance for Quality Transportation Construction
Richard (2014). Asphalt Pavements.
Al-Tarkeet (2002). Quality control-quality assurance impact on asphalt pavement.

The technical manual most relevant to the State of Alaska and their project requirements is the Alaska Standard Specifications for Highway Construction. The manual gave significant insight as to what is expected of contractors during every phase of a highway project. The "blue book" as it is known in the field, is a manual all contractors must follow unless special provisions are issued during preconstruction. The book is divided up into specification sections. For most projects, the general specifications are located in the front of the book and the specific specifications for material types such as concrete, asphalt, etc. are located in the mid-section and end section. The majority of asphalt related specifications are located in section 401. This is a well-known specification number and contractors reference this number in numerous reports.

Within the section 401, the contractor can find the approved methods for sampling and testing, how the bonus structure is calculated and all payment terms. Project teams can also use the standard specification book to aid in preconstruction tasks and closeout tasks. This version of the blue book was updated in 2015, the first time in 10 years.

The project manager used the blue book to learn about the methods currently used in the field. The blue book also created a pathway for the project manager to identify possible improvements. Once the current methods were identified and potential topics for discussion with interviewees established, the project manager used the gathered information to formulate the interview questions. Where the manual was lacking supporting evidence, the interviews filled the gaps.

The second technical manual relevant to the project was the Western Alliance for Quality Transportation Control Manual. This manual focused on the execution process of quality control. Again, the manual is broken into specific material sections, but there is a comprehensive section on asphalt quality control testing techniques. This manual and all techniques mentioned in the manual are exactly what quality control material technicians are expected to know and are tested on before they can receive their WAQTC certification. It was important for the project manager to understand the rigor of the certification required by the State of Alaska DOT for the quality control material technicians. After the project manager gained an understanding of the certification requirements, further interview questions were written.

After the project manager reviewed and extracted pertinent information from the technical publications, academic journals were reviewed. Asphalt Pavements (Richard, 2014) was used to understand the new technologies available for asphalt quality control measures. The project manager researched how the execution phase of projects has potential to be upgraded if the field team supports the ideas. These new technologies and methods sparked conclusive interview questions to be asked of interviewees. The engineering and detailed theories regarding asphalt were not utilized from this academic journal.

Another journal that supported the creation of interview questions was written in 2002. The project manager needed to build a foundation as to why the stakeholder's should care about this project. The

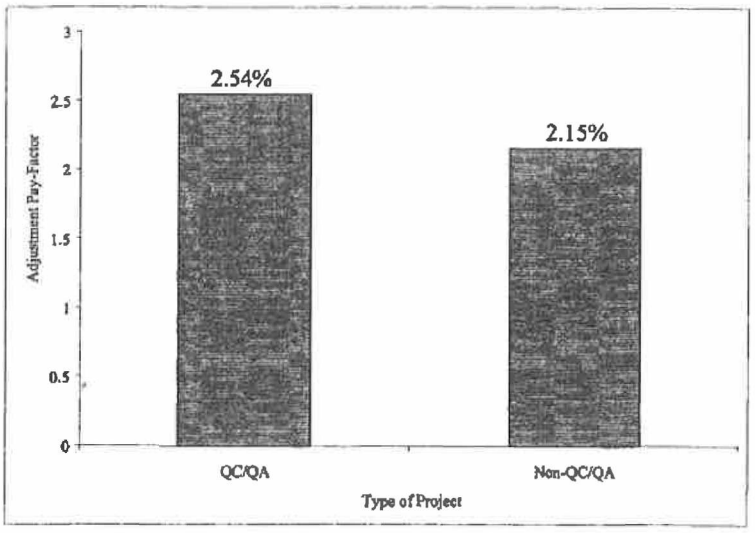

Figure 4: Project Type VS. Pay Factor Outcome (Source: Al-Tarkeet, 2002)

journal "Quality control-quality assurance impact on asphalt pavement" shed light on the major and minor impacts asphalt quality control has on projects (Al-Tarkeet). The study compared project cost incentives of QC/QA projects versus non-QC/QA projects. Figure 4 shows the cost incentive relationship in graphical form. Along the Y-Axis, the adjustment pay-factor refers to the overall fee structure the contractor earned over the life of the project. A pay factor calculation of 1.0 means the contractor earned 100 percent of their bid line item. A pay factor greater or less than 1.0 means the contractor earned more or less, respectively, than the bid line item. In the case of Figure 4, the projects who utilized QC/QA methods had a 0.39 percent higher adjusted pay factor. The project manager used this determination to begin the manual. Paying attention to how costs are directly tied with ample and improved quality control measures kept the high interest-high impact stakeholders satisfied.

Questions from the interviews such as, "How important is quality control to the success of an asphalt project?" stemmed from the report written by Al-Tarkeet (2002). Both the answers from the interviewees and the determination in Al-Tarkeet's (2002) report supported the creation and fulfillment of this project.

Data Analysis

Intro to Data

The project manager analyzed data for the quality control manual by phase. A typical asphalt project has three phases: Preconstruction, execution and closeout. Each phase was analyzed individually. The first step included coding each interview transcript. The project manager reviewed each transcribed interview and coded the responses into three categories: Preconstruction, execution and closeout. The project manager completed a secondary coding sequence. This entailed the transcripts being coded again, this time regarding a method of quality control for each phase of a project (Preconstruction, execution and closeout). After the coding was complete the project manager analyzed the data. The data was compiled in such a way to quantify and visually represent the frequency of quality control measures used. For each graph, a higher rating for frequency indicated how often the method was discussed during the interview process. The effectiveness of each method used was rated on varying scales. The data from each respective phase was meant to be analyzed individually and therefore resulting in various scale measurements with one consistently being the lowest score. It was assumed that due to the type of population polled, the data was credible and valid. The next section will discuss these results of the histograms and develop a basis for the final conclusion. It is important to understand there is not only one way to increase quality control effectiveness. All methods should be addressed and thoroughly reviewed.

Preconstruction

After polling a multitude of highly qualified asphalt quality control representatives and SME, it was determined that the methods detailed in Table 1 are currently used as asphalt quality control during the project initiation, bidding and pre-construction phase.

Current Quality Control Methods Utilized
Material Planning
Expectations from DOT
Update Training
Financial Considerations

Table 1: Current Quality Control Methods Utilized in Preconstruction

Considering the current methods used during project initiation and preconstruction, the project manager collected frequency numbers through the coded interview transcripts. Figure 5 graphically identifies all frequencies of use for each quality control method. Figure 5 also indicates the effectiveness of each quality control method, as supported by the SMEs. Material planning refers to the determination of different sources of material to be used for a project. Expectations of DOT are those specifications doled out before the project and final design is completed. The method of updating training is in reference to ensuring all quality control technicians complete proper training and all certificates are in compliance. Last, financial considerations are those techniques used to compile the quality control bid line item. Figure 5 shows a frequency score of 6 and an effectiveness score of 3.67 for the method, "Expectations from the DOT". The frequency score of 6 is one of the highest scores on the graph. A high score indicated the method was often discussed in the interviews conducted by the project manager. The project manager reasonably inferred from the SMEs and the data outcomes that a method discussed often required attention. From figure 5 and the support from SME, it was determined to best improve the effectiveness of preconstruction quality control methods, "Expectations from the DOT" was the best method.

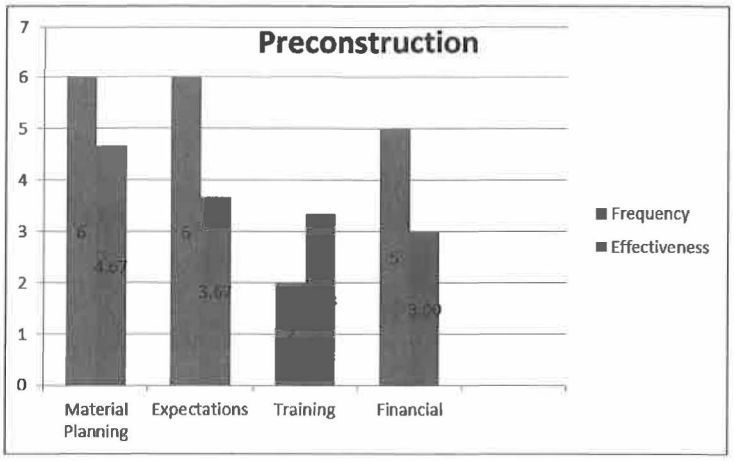

Figure 5: Histogram for QC Preconstruction

Execution

The same group of SMEs' data was pulled to determine the current methods used during the execution phase. Table 2, similar to above, depicts the current quality control methods used in the field during project execution.

Current Quality Control Methods Utilized
Personnel
Efficiency
Consistency
Equipment/ Techniques
QC/QA Relations

Table 2: Current Quality Control Methods Utilized during Execution

Similar to preconstruction, the project manager compiled all coded transcripts and numerically graphed frequency of quality control methods used and the effectiveness of each method. Personnel accountability is a method used in the field to determine the quality control team needed during the execution of the project. Efficiency is referring to how production is measured. In asphalt construction, production is measured in dollars per square ton. Consistency is a method quality control teams often use to ensure the test results are repeatable throughout the entire project. Equipment and techniques are those technical methods identified to support efficiency and consistency in every project. Finally, a QC and QA relation refers to the relationship between how the quality control team and the DOT team work together. Figure 6 shows each method and its association to others in regard to frequency and effectiveness.

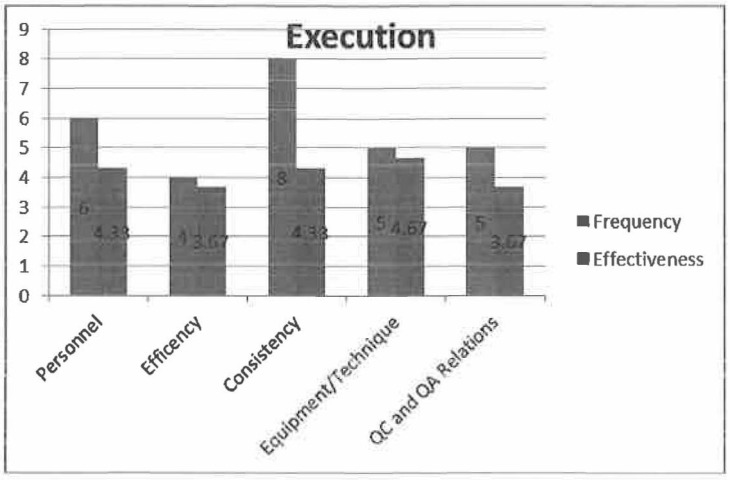

Figure 6: Histogram for QC Execution

In figure 6, consistency received the highest rating as well as a high effectiveness score. This method was not recommended as the one method to improve the overall efficiency of quality control during the execution phase. The project manager determined this method did not require significant changes. The consistency method is a strong method already. Instead, the project manager and SMEs concluded, "QC and QA Relations" is a method that cannot afford to slip further from the mainstream methods utilized. Therefore, the execution method recommended was "QC and QA Relations."

Closeout

For the closeout phase, the project manager determined the current utilized quality control methods are those listed in Table 3.

Current Quality Control Methods Utilized
Paperwork
Overall Results
Importance of Contractor QC

Table 3: Current Quality Control Methods Utilized during Closeout

Again, much alike preconstruction and execution, the project manager compiled all coded transcripts and numerically graphed frequency of quality control methods used and the effectiveness of each method. For the closeout phase, the "paperwork" method referred to the final documentation of the tested asphalt and materials. The "Overall Results" method focused on lessons learned and final payment. Third, the "Importance of Contractor QC" method regarded the overall closeout process. Figure 7 is comparable to the above histograms, in such a way that each method was graphically shown with frequency and effectiveness in mind.

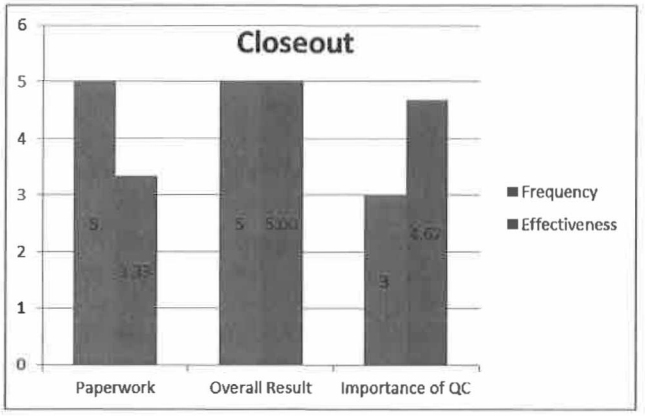

Figure 7: Histogram for QC Closeout

For the closeout phase, it was determined that the "overall result" of the asphalt project scored a 5 for frequency and a 5 for effectiveness. The SMEs concurred that the "overall result" of a project is a highly recognized and effective method to use during quality control closeout. A consensus of the SMEs and other critical stakeholders, including the project manager is that the "Importance of QC" is the method that will improve the overall efficiency of the closeout phase for quality control.

Correlation Between Phases

The data did not show any strong correlations between each phase. Instead an inference derived from SME's interview transcripts can be made. A slight trend can be drawn. The execution phase is discussed significantly more than both the preconstruction phase and the closeout phase. During the interview process, the execution phase was brought up to be the clearest and most well designed quality control phase but also needed the most work to improve efficiency. Because this is the most commonly discussed phase, the data shows a lull in both the preconstruction frequencies as well as the closeout frequencies.

Conclusions

Project Closeout

This project's main intent was to improve efficiency of contractor-supplied quality control measures on asphalt based State of Alaska owned roads construction projects and decrease rework. In order to accomplish the project goal, the project manager produced a manual that is available to all contractors, consultants and DOT asphalt quality control employees. This project accomplished the established goal by bridging the gap between budget control and production. The project shed light on how quality control was the link between the contractor's budget and production during the life of the project. Focus was on the three main phases of asphalt construction projects: Preconstruction, execution and closeout.

The research question, "What are the methods to effectively and efficiently improve contractor-supplied quality control measures on asphalt heavy civil construction projects on State of Alaska-owned roads?" was fully answered by producing a quality control manual with recommendations. The manual was the best solution to the inefficiencies in contractor asphalt quality control because the State of Alaska drives the specifications for all projects. In order to increase net revenue for the contractor and decrease costs for the State of Alaska, a focus on improving previously imposed methods was pertinent. This manual acknowledged the current methods used and recommended advancements for each method.

Final Recommendations

It was determined that all methods currently used are relevant to strong QC on all DOT asphalt projects. Further, the data pointed to three significant quality control methods to improve the overall efficiency of quality control on asphalt projects. If followed, contractors will most likely see a financial benefit and a significant decrease in rework. It is important to understand there is not one method in particular that will significantly increase the effectiveness of asphalt quality control. A multitude of means and methods must be employed for the greatest effect to be accomplished

For the preconstruction phase, four methods were discussed and analyzed. The top two discussed during the interviews as shown in Figure 5 are material sourcing, and State of Alaska DOT expectations. The first method was material sourcing. Determining the source(s) of material for the project and source management are large financial responsibility to the contractor. Importing material versus using local sources each has a separate debt to benefit ratio and source management will create less testing during the execution phase if planned correctly. Material Sourcing is a quality control method that must continue to be utilized. Early identification of sources and management of those sources once identified will reduce quality control money that can be delegated to another section of the project and increase net revenue for the contractor.

The second method was State of Alaska DOT Expectations. The DOT plays the largest role in how the quality control will be executed for each project. Since the DOT is the primary owner and controls how the funding is distributed, it is pertinent to recognize their expectations. That being said, learning how to mold the DOT's expectations to work for each project can be beneficial to the contractor's quality control program. SME's agree that sampling procedures are pre-determined by the 2015 Standards Specification Book and the WAQTC. These are available to the contractor and before the execution of a project, should be read and understood. Specifications are determined for quality control during the preconstruction phase. It is common to see copied specifications from project to project with no regard to project specifics. These causes unreasonable specifications to be implemented that are costly to both the contractor and DOT. Build in a small amount of contingency for those specifications to be reviewed during preconstruction. It will cost a small amount up front, but will greatly reduce project costs in the

field. This is why the data supported a focus on "Expectations from the DOT" as an effective quality control method to support overall changes in efficiency of quality control.

Execution is the bulk of the project. This phase is where the asphalt is produced and multiple issues can compound and affect the quality control system of the project. The top two methods the data shows are consistency and personnel. The method of consistency during project execution will yield the best results. Most project QC teams utilize the current methods correctly. Where improvement is needed, is how to intertwine all methods at once. This will lead to the most consistent quality control during the execution phase. This method, according to the SME's needed only slight adjustments, therefore was not the ideal candidate for the top efficiency improvement method.

The second method was personnel. The execution phase is often a whirlwind of task and activities to complete the project. The SME's confirmed that the best improvement for this method was identifying all tasks to be completed during the execution phase and outlining them for all personnel. As Figure 6 denotes, this method is highly discussed but correlates with a simple resolution.

In this phase, the data supported a focus on "QA and QC Relations" as an effective quality control method to support overall changes in efficiency. The reasons are due to the lack of effectiveness. Figure 6 shows only a 3.67 for effectiveness. The SME's discussed often in their interviews the importance of this method. The State of Alaska DOT, who runs the quality assurance program, can play a large role in how efficient the quality control is. Often the fact that the quality control and the quality assurance have completely different jobs is overlooked. The quality control team's job is to support the contractor and minimize asphalt mix issues before the product is placed. The quality assurance team's job is to test the product for payment. Where improvement can be made is how these two teams work together. The more often results are communicated from both sides, the earlier critical risks can be identified. When risks are identified quickly, the risk of rework in lower and the contractor can increase their net revenue.

The closeout phase regarded the following two methods as matters to focus on: Overall result of the project and the importance of QC. The overall results are what matters to the State of Alaska DOT and to the contractor. Because the payment terms are tied directly to the final deliverable, contractors are well versed in how to ensure all affairs are in order. They often review final bonus structures, complete lessons learned and conduct a ride test. These results directly correlate with the frequency and effectiveness results. This method is often used and discussed on many projects during closeout and SMEs agree on the effectiveness of this method.

The quality control team does not receive enough credit for the amount of work each team produces just to keep the production on par and to ensure all money possible is earned. This is a major issue and must be addressed. The difficulty is determining the best method to increase quality control recognition. This will not be a method that is created overnight. It is a method that has been deemed effective if utilized in the correct fashion. The SMEs chose this method because of the potential power it can have on building a stronger quality control system, which will in turn significantly inflate the revenue for the contractor.

Lessons Learned

Building a manual for asphalt contractors to utilize during all phases of construction was needed in the construction industry. With this tool, contractors will see a realized cost saving on future projects. For the manual creation process, it is beneficial for all future project managers to document lessons learned.

For this project, the project manager diversified the interviewees within the asphalt construction industry. Utilizing subject matter experts from contractors, consultants and DOT employees ensured the quality

control manual's recommendations pulled from all players of a typical asphalt project team. For this reason, the recommendations the manual produced are valid. Future projects should include a more robust group of interview subjects. The current project's timeline did not support a larger group of interviewees but the deliverable would have benefited significantly if a minimum of 20 interviewees had been polled. A larger group of SME's would further support the data found. A larger number of quality control improvements might have also been identified and researched.

The project manager chose to discuss topics related to asphalt quality control on all State of Alaska DOT projects. This tactic resulted in a strong deliverable for contractor use, but the shortcoming is the lack of detail the manual covered. In another similar instance, it may be important to either choose roads or airports. Each type of project follows a different set of specifications and is often bid out differently. Focusing on roads or airports will allow another manual to delve deeper into the quality control methods.

The project sponsor played a large role in the creation of the scope statement. The project manager strongly suggests completing a similar project alongside the project sponsor. Planning meetings with the sponsor in attendance, allowed for a final project scope, fully supported by the sponsor. The project manager followed the scope statement to write the manual which resulted in a satisfied project sponsor.

Further Research

After the project manager finished the background research and finished all interviews, it became apparent that further research surrounding asphalt quality control is needed.

Best Practices for all Material QC

The final deliverable, a manual discussing technique to improve asphalt quality control for contractors, effectively covered asphalt quality control. This manual did not cover material testing as a whole. In an effort to continue the improvement of quality control on DOT projects in the State of Alaska, the project manager recommends a separate project that supports all types of material quality control. Asphalt is the material type stakeholders see and analyze the most. Often the sub-base material, base course material, shouldering material, etc., plays a significant role on road and airport jobs. The quality of this material must be checked. If the layers of rock under the asphalt are not properly chosen and placed, the life of the asphalt will be hindered. A manual or peer reviewed journal highlighting quality control best practices for all material used on asphalt DOT roads and airports will contribute to the overall success of projects.

A Focus on Execution

As organized in the project, there are three phases of a project: Pre-Construction, Execution and Closeout. The current project covered all three phases for asphalt quality control. The execution phase is typically where quality control is predominantly focused. The current project did discuss how to improve effectiveness during the execution phase, but much was left desired. A project focused solely on techniques used during execution will aid construction efforts in the future. During the execution phase, the financial status of a project fluctuates. Further research regarding methods to use quality control as a financial stability tool during execution will also be a tactic construction teams can utilize. In the final stages of a project, the amount of money made on a project is tallied and analyzed. The better the final number produced is, the more likely the contractor will have sufficient work the following year.

DOT and Contractor Relations

The deliverable of the present project mentioned a need for the contractor and the DOT to work together in a specific way. The following quote from the QC manual discussed QC and QA relations:

> "Currently, most project teams utilize the QA results to support QC results and communicate with the QA. These methods are sufficient, but more confidence in the QC results needs to be instilled.

> If the contractor has a solid QC team that has proper training, the correct equipment, utilizing efficient and consistent techniques, the results produced are valid. If confidence the QC results can be achieved, the blend can be adjusted long before the QA has a trend of results to report" (Robson, 2015, p.13).

This topic begs for further discussion. The DOT and contractor relationship history is one that has never been fully developed but utilizing subject matter experts, who are in the field and can attest to conditions seen on a typical project, will be of most help with the matter.

References

Alaska Department of Transportation and Public Facilities Standard Specifications for Highway Construction Manual. November 2015.

Al-Tarkeet (2002). Quality control-quality assurance impact on asphalt pavement. University of Wyoming, 2002.

Empie, M., Flynn, J., MacKinnon, J., Nevela, M., Nordale, M., Reilly, A., ... Tuckness, G. (Eds.). (2015, December 1). Winning Bids and Construction Trends. The Alaska Contractor, 1-84.

Richard, Kim. (2014). Asphalt Pavements, Volume 1. CRC Press.

Robson, Alena. 2015. Contractor Quality Control: A manual to improve efficiency in contractor supplied quality control on asphalt heavy civil construction projects on State of Alaska-owned roads.

Western Alliance for Quality Transportation Construction. November 2014.

Acknowledgments

A large thank you goes out to all those who have supported the production of this manual. This includes all who participated in interviews, all who have spent time on the phone with me to clarify data or give input on field experiences and my project team.

Thank you to the State of Alaska Department of Transportation for supplying the 2015 version of the Standard Specification Book.

Thank you to R&M Consultants and Weed Engineering who supplied me with many field experiences in both rural Alaska as well as in the greater Anchorage vicinity.

Thank you to the contractors who supplied their thoughts and personal field experiences with asphalt quality control.

Thank you to my sponsor of this project, Amanda Gilliland, from Knik Construction, for building the basis and expressing the need for this type of project.

Thank you to my friends and family for reviewing the manual and final report and supporting me while I finish my master's degree.

Thank you to the University Of Alaska Project Management Department for allowing me the opportunity to complete this project.

Appendix A

Stakeholder Register

Stakeholder ID		Identification Information				Assessment Information			Classification		
		Organization/Location	Position/Title	Role	Contact Information	Major requirements	Measures of Success	Expectations	Classification (e.g. P/I, P/I, I/I, Sallence, etc.)	Current Level of Support	Desired level of support
	Internal Stakeholders										
1	Amanda Gilliland	Knik Construction/ Anchorage	QC Manager	Project Sponsor	amandag@lynden.com	Contacted at each milestone, major changes to the charter, would like to attend presentation of deliverable	Completed deliverable on schedule	Finished product that contractors and the State of AK DOT can utilize	Leading	Medium	High
2	Alena Robson	UAA/Anchorage	Student	Project Manager	907-420-7818, alenarobson@gmail.com	Complete PMP and Final deliverable, align and manage stakeholders, communicate through proper channels, present status updates to key stakeholders	Committee and sponsor approve PMP and support final deliverable	All PPMs will be completed on schedule, individual meetings with key stakeholders are completed throughout project	Leading	High	High
3	Seong Kim	UAA/Anchorage	Faculty	Committee Member	sdkim@uaa.alaska.edu	Provide timely feedback, attend final presentation	PM recieves feedback within 5 days of PPM submission	PPMs submitted on time, final presentation is on schedule	Leading	High	High
4	LuAnn Piccard	UAA/Anchorage	Faculty	Committee Member	907-786-1924, luannpiccard2@uaa.alaska.edu	Provide timely feedback, attend final presentation	PM recieves feedback within 5 days of PPM submission	PPMs submitted on time, final presentation is on schedule	Leading	High	High
5	Roger Hull	UAA/Anchorage	Faculty	Primary Advisor	907-786-1923, rkhull@uaa.alaska.edu	Provide timely feedback, attend final presentation	PM recieves feedback within 5 days of PPM submission	PPMs submitted on time, final presentation is on schedule	Leading	High	High
6	PM Administration	UAA/Anchorage	Administrative Support	Project Administration	907-786-1924, msaechao2@uaa.alaska.edu	All administrative duties are completed on time	Administrative duties are met	Contact when an administrative issue arises	Supportive	medium	medium
7	Dan Lindblom	Secon/Juneau	QC Manager	Unoffical Committee Member	907-723-0110, dlindblom@colaska.edu	Facts are legitimate, manual is suitable for all asphalt SOA projects	Interviews are utilized to prove validity,	Will be primarily involved in execution, communicate during the writing of the manual to keep facts legit	Supportive	Medium	Medium
8	Ryan Loomis	CH2MHILL/Anchorage	Project Controls	Student Committee Member	ryan.loomis@ch2m.com	Project is tracking	PPM's are met	Communicate when issues arise	Supportive	Medium	Medium
	Contractors	Various	Various	Various	Various	Deliverable is useful	Completed deliverable on schedule	Finished product that contractors and the State of AK DOT can utilize	Supportive	High	High
	External Stakeholders										
10	State of Alaska DOT	State of AK	Various	Various	Various	Specifications are still met	Completed deliverable on schedule	Consulted during interview process	Neutral	Low	Low
11	Consultant Firms	Various	Various	Various	Various	Specifications are still met	Completed deliverable on schedule	Consulted during interview process	Neutral	Low	Low

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September 9, 2014

University of Alaska Anchorage
Project Management Department
University Center, Room 155
3901 Old Seward Highway
Anchorage, AK 99503

Attention: Roger Hull

Subject: Alena Robson Support Statement for Master of Science in Project Management

Mr. Hull,

The purpose of this letter is to express my support as a sponsor for Alena's capstone project topic: A manual to Improve Efficiency in Contractor-Supplied Quality Control Measures on Asphalt Heavy Civil Construction Projects on State of Alaska-Owned Roads. As Quality Control Manager for a heavy civil construction company, I understand the current stringent and often unnecessary quality control requirements for State of Alaska Department of Transportation projects. Finding ways to optimize efficiency for quality control, without jeopardizing the quality of the project are of great interest. Creating a manual that covers this topic would be a valuable tool for both contractors and the Agency.

Sincerely,

Amanda Gilliland
Quality Control Manager
Knik Construction Co., Inc.

Contents

I. Introduction

What is Asphalt Quality Control?

Quality control, in general terms, is the act of ensuring that a quality product will be delivered as an end result. In terms of asphalt, quality control will make or break a project. Asphalt is sampled using multiple methods to determine whether or not the asphalt meets the standard specifications dictated by the owner.

Why is Asphalt Quality Control Important?

Asphalt is the most expensive line item in a project's bid. It is what the public eye sees and feels when they drive the new road. The taxpayers, who ultimately fund the cost for the roads and airports to be paved, need to feel confident that their money is spent well. The owner, in this case, the State of Alaska DOT (SOA), is held responsible for spending that money wisely. If a contractor cannot produce an asphalt product worthy of the taxpayer's money, they will not get paid. With Asphalt currently costing the contractor about $100 per ton, and an average paving project consisting of 30,000 tons, the contractor has no choice but to produce a quality road or airport for the State of Alaska.

The best way to ensure that the contractor produces an asphalt product worthy to the State of Alaska DOT is to conduct quality control. This not only saves the contractor time and eliminates the guessing but also demonstrates to the taxpayers that their money is being well spent.

What is the purpose of this Manual?

Contractors face financial and scheduling risks if these standards are not addressed effectively and in conformance with necessary criteria. Contractors must complete project work to meet customer requirements and conform to quality standards in an efficient and cost effective manner. Doing so ensures that the State of Alaska's quality standards are met and contractors' financial and schedule targets can be achieved with the most efficient use of scarce resources. Currently, there is an indirect cost savings to the contractor to perform their QC in a specific manner because it reduces or in some cases eliminates rework. The desired result is to directly save money by applying efficient quality control methods. This manual describes best practices and quality control procedures that can be applied by heavy civil asphalt construction contractors to meet necessary the SOA quality standards in a more timely, cost effective and efficient way. The correct application of this manual may result in a savings of >1% on the bid cost per asphalt ton.

Who is this Manual Intended for?

This manual will benefit any contractor quality control manager who is interested in streamlining their overall QC means and methods for the State of Alaska DOT Asphalt projects.

This manual will also benefit any contractor representative who is interested in the best approach to contractor quality control for their company.

II. Current Quality Control Methods

Asphalt Project Initiation, Bidding Process, Pre-Construction

Polling a multitude of highly qualified asphalt quality control representatives, it was determined that the following methods are currently used as asphalt quality control during the project initiation, bidding and pre-construction phase:

Material Planning

- Sources of material are determined
- QC needs established for local vs. imported material

Expectations from Alaska DOT

- Sampling procedures are pre-determined but vary from region to region
- Specifications for QC portion are finalized

Update Training

- WAQTC Training is considered for Material Technicians
- Determination of available Material Technicians resources

Financial Considerations

- During estimation, a set percent of available funds, based on total tonnage, goes toward asphalt QC
- An estimate of QC hours is determined for specific projects

Asphalt Project Execution, Paving Phase

Polling a multitude of highly qualified asphalt quality control representatives, it was determined that the following methods are currently used as asphalt quality control during the project execution and paving phase:

Personnel Accountability

- A different team to prepare for the project vs. that planned for the project
- Balance available funds versus need for Material Technicians
- Educate personnel on job requirements

Efficiency

- Focus on production

- Identify all ways keep operation continuous

Consistency

- Utilize specifications from Standard Specification book
- Follow QC rules imposed by the prime contractor
- Maintain same mix design through entire project
- Draft competent process for asphalt testing to be enacted
- Assure appropriate paperwork for document results is used

Equipment Usage/Technique

- Check equipment and calibrations at start of project
- Use approved ASTM techniques to determine quality of asphalt
- Continual education on new techniques for a better product

QC vs. QA Balance

- Utilize QA program to support QC results
- Communicate with QA to support tweaks during production
- Instill confidence in QC results

Asphalt Project Closeout Phase

Polling a multitude of highly qualified asphalt quality control representatives, it was determined that the following methods are currently used as asphalt quality control during the project closeout phase:

Paperwork

- Review major changes in product
- Ensure changes in tests are documented
- Final payment is dependent on final results

Overall Results

- Review final bonuses
- Lessons Learned
- Conduct ride test

Importance of QC

- Separate closeout team

III. Project Initiation, Bidding Process, Pre-Construction

It is important to understand there is not one method in particular that will significantly increase the effectiveness of asphalt quality control. A multitude of means and methods must be employed for the greatest effect to be accomplished. However, this section and the following sections will suggest the best method to make the largest difference in the effectiveness of asphalt quality control. Essentially, focusing on the method with the most importance and the largest impact will create a better asphalt quality control plan. Ultimately a better product for the owner equates to better payout for the contractor, both financially and publically.

After reviewing the current methods used in the field during the three phases of the project: Preconstruction, Execution and Closeout, the next step is to discuss how to create a better system in the field using the current methods as a baseline.

This section will elaborate specifically on project initiation, the bidding process and preconstruction with regards to asphalt QC. Project planning, in respect to the overall project, is the foundation to every other phase. When a project begins with a strong base, the likelihood of success increases tenfold. The same goes for asphalt quality control methods. Kicking off the project initiation phase with a sequential quality control plan for the duration of the project will aid in quality product.

This portion of the manual will cover two subsections. Subsection one will focus on the current methods and the best ways to improve on them. Subsection two will focus on the best method to improve the overall contractor asphalt quality control during project initiation.

Improve Current Methods

Material Planning

Currently the two primary utilized preconstruction asphalt quality control methods under material planning are:

- Sources of material determined
- QC needs for local vs. imported material

Determining the source(s) of material for the project is a large financial responsibility to the contractor. Importing material versus using local sources each has a separate debt to benefit ratio. This is a method that must continue to be utilized. The ideal way to complete material planning is to use 3rd party pre-crushed material. This eliminates quality control money that can

be delegated to another section of the project and puts the ownership of the product on the supplier.

The second major improvement to material planning for asphalt QC is stockpile management. Reviewing the sources available will aid in the creation of the mix design and eliminate rework for the quality control technicians. Understanding the sieve screens needed to support quality control during project execution also eliminates rework.

Expectations from DOT

Currently the two primary utilized preconstruction asphalt quality control methods under "Expectations from DOT" are:

- Sampling procedures are pre-determined but vary from region to region
- Specifications for QC portion finalized

The DOT plays the largest role in how the quality control will be executed for each project. Since the DOT is the primary owner and controls how the funding is distributed, it is pertinent to recognize their expectations. That being said, learning how to make the DOT's expectations work for each project can be beneficial to the contractor's quality control program.

Sampling procedures are pre-determined by the 2015 Standards Specification Book, the WAQTC and the ATM. These are available to the contractor and before the execution of a project, should be read and understood. To improve the effectiveness of the sampling procedure expectation from the DOT, keep sample techniques consistent. This means during preconstruction, the quality control manager should determine which sampling method to use. This will accomplish two things: the field quality control material technicians can become proficient at one method, and two, it will save the DOT and contractor money.

Specifications are determined for quality control during the preconstruction phase. It is common to see copied specifications from project to project with no regard to project specifics. This causes unreasonable specifications to be implemented that are costly to both the contractor and DOT. Because this is unfortunately in the hands of the DOT, contractors often ask, what can we do about it? The answer is to be prepared. Build in a small amount of contingency for those specifications to be reviewed during preconstruction. It will cost a small amount up front, but will greatly reduce project costs in the field.

Update Training

Currently the two primary utilized preconstruction asphalt quality control methods under "Update Training" are:

- WAQTC Training for Material Technicians
- Determination of available Material Technicians

Training is an important aspect to any business striving to climb the ladder of success. Same goes for construction companies. Currently WAQTC training for all QC Material Technicians is required by the DOT. Contractors will see the benefits if they follow this requirement. About 50% of material technicians on DOT asphalt projects are WAQTC certified. Of those that are certified, 50% are current certifications. Those material technicians who were certified were more likely to support their testing techniques if/when challenged in the field.

The second thought by those polled, was how build a successful quality control personnel plan. It is the foundation to the quality control plan. There is not one best answer but generally, 1 person for a small project 2 people for a medium project and 3 for a large project is sufficient. The question is then asked, "What constitutes a small, medium or large project?" This is where judgment must be considered. Consider the budget, the qualified personnel available and the tonnage to be paved. Be sure enough qualified personnel are available for all projects. Preconstruction is the best time to build a staffing plan strong enough to endure the execution of the project. Do not wait until execution.

Financial Considerations

Currently the two primary utilized preconstruction asphalt quality control methods under "Financial Considerations" are:

- During estimation, a set percent of available funds, based on total tonnage, goes toward asphalt QC
- Estimate QC hours needed for project

Every contractor understands that the bottom line is what equates to success. Especially important is how quality control is handled. The best time to plan for QC funding is during preconstruction. Currently, a set percentage of available funds, based on total project tonnage is applied to asphalt QC. This is a consistent and fair way to review QC funding. This allows for larger projects to staff appropriately.

Estimating quality control hours needs to have a consistent method. Contractors build their own way on how quality control hours are estimated, but the method needs to stay consistent. This does two things: First, the future projects will have a number to base the estimation off of and second, it will keep the DOT happy. The DOT needs to know their product is considered important and a way to accomplish that is to present them with a set number of QC hours for the project.

Best Method to Improve Contractor QC

To best improve the QC during the preconstruction phase, focus the majority of the energy on the expectations from the DOT. There is much to be learned in this subject that will benefit the contractor financially and increase success in the field.

IV. Project Execution, Paving Phase

This section will elaborate specifically on project execution, the paving phase. It will cover two subsections. Subsection one will focus on the current methods and the best ways to improve on them. The second subsection will focus on the best method to improve the overall contractor asphalt quality control during project execution.

Improve Current Methods

Personnel Accountability

Currently the three primary utilized execution asphalt quality control methods under "Personnel" are:

- Different team to prepare for project than used on project
- Balance available funds versus need for Material Technicians
- Advise personnel on job requirements

Again, personnel are brought up under project execution because each technician and QC team member is the basis for the execution of quality asphalt. More often than not, a different team is used during preconstruction than used in the field on during execution. Moving forward it will benefit all if these two teams can be aligned. It may not be feasible to align 100 percent, but having at least one common tie will keep the two phases on the same path.

In the preconstruction phase, we discussed balancing QC needs versus the funding available for each project. During execution, the funding allocated is being spent. Keeping an eye on how many material technicians are on the job will allow for efficiency for the duration of the project.

Personnel are advised on their job requirements as part of the execution process for QC. This is a necessary step in the beginning stage of execution, but the specifics are often missed. Be sure to layout exactly what each material technician is responsible for. This will ensure no aspect of QC is missed. The execution phase is a whirlwind and tasks can easily fall through the cracks. Some tasks to be considered are:

- Daily Plant inspection
- Stockpile gradations
- Calibration of equipment
- Responsibility of cleaning sampling devices
- Is a runner needed?

- Consistency of mix documentation
- Reporting of results
- Temperature check

Efficiency

Currently the two primary utilized execution asphalt quality control methods under "Efficiency" are:

- Focus on production
- Identify techniques to keep operation continuous

Currently the QC team is focused on production and ensuring the operation is as smooth as possible. These are strong attributes to create efficiency. To improve on these, the QC team needs to understand the basis of these features. Smooth production equates to a better product and a better product will produce a good payout from the owner. Knowing that, how do we continue to produce while focusing on improving production? Efficient communication is the answer. The best quality control teams can keep the project spinning and producing while still looking for ways to improve by communicating. When an issue arises, the teams with the best communication will fix the problem before it affects production.

Consistency

Currently the five primary utilized execution asphalt quality control methods under "Consistency" are:

- Utilize specifications from Standard Specification book
- Follow QC rules imposed by contractor
- Same mix design through entire project
- Process for asphalt testing in place
- Paperwork to document results is used

Most who understand QC in any respect, will agree that consistency in testing during execution will yield the best results. Most project QC teams utilize the current methods correctly. Where improvement is needed, is how to intertwine all methods at once. This will lead to the most consistent QC during the execution phase. Often teams will use one method or a couple methods and not pay any attention to the others. QC closeout is much simpler if the methods are all used and used in the same way.

Equipment Usage/Technique

Currently the three primary utilized execution asphalt quality control methods under "Equipment Use/Technique" are:

- Check equipment at start of project and calibrations as needed
- Use approved techniques to determine quality of asphalt
- Continual education on new techniques for a better product

Equipment usage and technique methods are subsidiary to most of the other methods on most projects. They should hold the same importance as all other methods. If the equipment is not operating properly or testing technique not established, the quality control will suffer.

Improving equipment use consists of checking all equipment daily before production starts. Tests can easily be failed if equipment is not operating properly. The second improvement to this method is choosing a consistent technique. Especially when splitting the sample of asphalt. The split of a sample is the most important step in the testing of asphalt. The WAQTC manual allows for three different approved splitting methods to be used. Poll the QC team and use the material technician who is most confident splitting. Be sure he or she splits through the entire project execution. Additionally, advise the technician to choose one method, preferably the one he or she is most comfortable with. Using this technique will eliminate one variable in results, which will be used to tweak the blend.

QC vs. QA Balance

Currently the two primary utilized execution asphalt quality control methods under "QC vs. QA Balance" are:

- Utilize QA program to support QC results
- Communicate with QA to support tweaks during production

Finally, we come to how the QA DOT team and the QC contractor team work together. Often the fact that the QC and QA have complete different jobs is overlooked. The QC team's job is to support the contractor and catch asphalt mix issues before the product is placed. The QA team's job is to test the product for payment. Where improvement can be made is how these two teams work together.

Currently, most project teams utilize the QA results to support QC results and communicate with the QA. These methods are sufficient, but more confidence in the QC results needs to be instilled. If the contractor has a solid QC team that has proper training, the correct equipment, utilizing efficient and consistent techniques, the results produced are valid. If confidence the QC results can be achieved, the blend can be adjusted long before the QA has a trend of results to report.

Best Method to Improve Contractor QC

To best improve the QC during the execution phase, focus the majority of the energy on the QC versus QA balance. There is much to be learned in this subject that will benefit the contractor financially and increase success in the field.

V. Project Closeout

This section will elaborate specifically on project closeout. It will cover two subsections. Subsection one will focus on the current methods and the best ways to improve on them. The second subsection will focus on the best method to improve the overall contractor asphalt quality control during project closeout.

Improve Current Methods

Paperwork

Currently the two primary utilized closeout asphalt quality control methods under "paperwork" are:

- Review major changes in product
- Ensure changes in tests are documented

The closeout of an asphalt project is most important in order to receive payment from the owner, in this case, the DOT. Reviewing the major changes that were made during the execution phase and ensuring the changes in tests are documented are the steps to be completed before the DOT will release final payment terms. This process needs to be as consistent and efficient as possible for every project. As a contractor, having a system in place that can be utilized for every closeout process will give the best chance at receiving all payment for the project.

First, use the same recording documents throughout the project. Record all results on this paperwork. Second, complete constant review periods during execution and after the project is substantially complete. This will catch any errors or changes made during execution. Finally, back up all test results. This can be done electronically if that is an option, or make copies and keep in the main project office.

Overall Results

Currently the three primary utilized closeout asphalt quality control methods under "Overall Results" are:

- Review final bonuses
- Lessons Learned
- Conduct ride test

As discussed in the previous subsection, the overall results are what matters to the DOT and to the contractor. Because the payment terms are tied to the final deliverable, contractors are well versed in how to ensure all affairs are in order. They often review final bonus structures, complete lessons learned and conduct a ride test.

The best outcome is for all possible payment to be received. The QC team should read and understand exactly the bonus structure for each project. During which lot(s) was the lowest pay factor? Was it calculated correctly? What does the QC results show? What does the QA results show? Are there any retests to be asked for?

If it is too late for the payment terms, each QC project team should conduct a lessons learned. Project teams currently complete a simplified version of lessons learned, but for every future project, having a repository of lessons learned specifically orientated toward QC, will save money for the contractor.

Importance of QC

Currently the primary utilized closeout asphalt quality control methods under "Importance of QC" are:

- Separate closeout team

Currently, the only method relating to QC for "Importance of QC" utilized is a separate closeout team. This team does not understand exactly what happened in the field during execution. The best method a contractor could adopt is to align the closeout team and the project field QC team. This can easily be the QC manager. He or she fully understands the means and methods used during execution and will aid in closeout substantially.

QC does not receive enough credit for the amount of work each team produces just to keep the production on par and to ensure all money possible is earned. This is a major issues and must be addressed. The difficulty is determining the best method to increase QC recognition. This will not be a method that is created overnight. It will take constant improvement and revision. The ideal way to begin is with salary. QC material technicians are the one position on a field project team that requires a certificate of training for WAQTC. In order to obtain this certificate, 20+ hours of studying and training must be completed. QC material technicians need to be compensated for the extra efforts. In the state of Alaska, contractors often run into union agreements and salary increases are not an option. If this is the case, an alternative option to increase QC recognition is to build the chain of command to include QC right below the project superintendent. Giving QC material technicians or QC managers the power to make decisions in terms of the product being produced will accomplish two tasks: First, it will demonstrate to the

DOT the seriousness of QC to the contractor and second, it will train internal teams to rely on QC so a better product will be made.

Best Method to Improve Contractor QC

To best improve the QC during the closeout phase, focus the majority of the energy on the importance of QC. There is much to be learned in this subject that will benefit the contractor financially and increase success in the field.

VI. Final Recommendations

After reviewing the above recommendations, all methods currently used are relevant to strong QC on all DOT asphalt projects. There are a few methods to improve on that will make each project easier to handle. If followed, contractors will most likely see a financial benefit.

To summarize the improvements:

Preconstruction

- Expectations from DOT

Execution

- QC versus QA relations

Closeout

- Importance of QC

Alena Robson
PM 686B
UAA MSPM
4/20/15

A Manual to Improve Efficiency in Contractor-Supplied Quality Control Measures on Asphalt Heavy Civil Construction Projects on State of Alaska-Owned Roads

Knowledge Area Mastery-PM686B

Stakeholder Management

Stakeholder management played a key role in the success of the execution of this project. I chose to emphasize stakeholder management as a knowledge area because the key stakeholders are driving the need for this project. The mastery of this knowledge area was achieved through gaining congruence, maintaining alignment and reaching acceptance with the key stakeholders. I worked to gain congruence with my key stakeholders through setting up meetings with each one to ask about project status. I asked them where they thought the project was at, and then I compared that to where I thought I was at. In all cases, the stakeholder's analysis of the project status was consistent with my own.

For PPM1, I used all the stakeholder tools to keep my major stakeholders informed. I used the stakeholder communication chart to update my major stakeholders. I set up biweekly meetings with both of my major stakeholders. I met with one via phone conversation and the other via email, per the communication matrix. From the stakeholders I have talked to, I met my goal of 90% for PPM1. During PPM2, my stakeholder communication chart was fully utilized to keep the communication log updated. I communicated with my stakeholders as requested. The biweekly meetings were productive in accomplishing each stakeholder's expectations. I achieved a 85% satisfaction level for PPM2. PPM3 was similar. I achieved a 90% satisfaction rate for my stakeholder. The communication plan was updated with all communications between stakeholders. For PPM4, I completed a "reaching acceptance" assessment. I was sure to have meetings with my key stakeholders to ensure I met their expectations with this project. After my discussions, the PM has determined that the 90% acceptance threshold had been met.

Alena Robson
PM 686B
UAA MSPM
4/20/15

Through meeting my KPI and updating my communication log, this knowledge are exceeded the mastery level initially set.

Communication Management

Communication management and stakeholder management complemented each other in a project of this stature. It was only appropriate that communication management was a second knowledge area. It was of upmost importance to communicate in the proper fashion with not only the stakeholders, but with the project team. All three of the committee members reside in Alaska, therefore emails and phone calls were the main method of communication.

The communication management knowledge area was applied to my project through a communication management plan. This plan detailed the means and methods of communication with each stakeholder, with my advisor, and with my committee members.

To measure the mastery of this knowledge area, I measured the communication of this project at four points, PPM1, PPM2, PPM3 and PPM4. For each of these points I looked at trends. It is well known that proper communication methods will aid in creating a successful project. There should be a direct relationship between strong communication between stakeholders and the project tracking well. For each PPM, I reported on the trend between the CPI and the stakeholder satisfaction. I looked for a direct relationship. If that was not the case, I looked at where the communication failed.

For PPM1, the trend was a direct relationship. The CPI for this project at that point was 1.02 and the communication with my stakeholders was about the 90% needed. This showed strong communication. For PPM2, the trend is again was a direct relationship. My stakeholders were at a 85% satisfaction rate while my CPI was at .95. Strong communication was evident for PPM2. For PPM 3, the trend continued to be a direct relationship. My stakeholder satisfaction decreased as did the CPI. For PPM4, the overall trend of communication management was a direct relationship. The stakeholder satisfaction rating was steady at 90% and the CPI for the project was at 0.99. It was important to note, that the direct relationship could have been positive or negative. Both are indications that communication methods were successful.

Risk Management

As with any project, risks must be identified as soon as possible. The nature of this project brought about a multitude of high level risks. If these risks were not identified and analyzed the project may have been classified as a failure. Identifying risk management as a knowledge area

gave this project the best chance at succeeding. Diving into the risks of the project and exactly how to manage those identified risks created a strong risk management plan. This knowledge area was applied to the project in the form of a risk management plan. The plan consisted of the following:

- Identity of high level and low level risks
- Mitigation and response measures for identified risks
- When unidentified risks arise, procedure to handle them

In order to measure the mastery of this knowledge area, I significantly focused on realized and unrealized risks. Specifically, I documented the process in which I identified them and exactly how they were analyzed. Mastery is evident when the realization matrix is completed at each PPM to show how both realized and unrealized risks were managed. The management techniques were consistent with the risk management plan.

For the duration up PPM1, there were 3 unidentified risks and 1 previously identified risk documented into the risk realization matrix. It was ideal to keep the ratio of unrealized risks to realized risk at 1:2, but documenting these risks in the matrix allowed for a better lessons learned and smoother execution. For PPM2, there were no unrealized risks and only 1 realized risk. This brought the ratio of unrealized risks to realized risks to 3:2. This was not ideal, but the fact that there were no major risks during PPM2 was a positive outlook. For PPM3, there was one unrealized risk and no realized risks. This brought the ratio back to 2:1. I did not meet the ratio goal, but it continued to be a reminder to follow the risk response plan. As an overall trend, the unrealized risk to realized risk ration did not meet the project manager's standards. This was a valid way to track risk management and to quantify the results.

Alena Robson
PM 686B
UAA MSPM
4/20/15

A Manual to Improve Efficiency in Contractor-Supplied Quality Control Measures on Asphalt Heavy Civil Construction Projects on State of Alaska-Owned Roads

Lessons Learned- PM686B

Following a project management plan and schedule through to execution is not an easy task. Even considering all the training through the PM program, there are always lessons to be learned. This document will discuss those lessons learned for the entire project lifecycle.

Research Methods Need to be Fleshed out Early

Category	Problem/Success	Impact	Recommendation
Schedule	Research method plan not fully developed before research begun	Final Deliverable and final report delayed	Use your IRB plan to build your research plan. If you are sending out surveys or conducting interviews, think about planning.

The research needed to complete both the deliverable and the final report does not get enough recognition. Research is the basis to how the rest of execution will be completed. Making the mistake of beginning this phase before it is fully developed, puts the project at risk for failure. It is the same as trying to build a pyramid without the base completed. Through this entire program we learn that planning and communication can make or break a project. The same principle applies to the capstone project. After 686A your project may be planned, but are all the details completed? Do you know exactly when to send out your surveys in order to maximize the results? When are the best time frames to contact your interviewees? These are all things I did not think about before I begun the data collection process. My recommendation

is to talk with your project sponsor and/or committee to determine if you are ready to collect data. They will know whether you have thought the process through enough or not.

Communicate with committee and sponsor

Category	Problem/Success	Impact	Recommendation
Quality	Positive communication	Project completed on time and quality was as expected	Continual communication with project team and sponsor will ensure the sponsor approves final deliverable

For this project, the project team set a standard to communicate with the committee once every two weeks. The project manager scheduled the meetings throughout the planning phase and the execution phase. The result of this positive communication with the committee team was that the project was a success. The entire project team was on board with every step of the project. When surprises hit, the entire team was ready to handle them according to the risk response plan.

Strong communication with the project sponsor resulted in a successful project. Each key stakeholder understood the progress of the project and did not experience any surprises.

Table of Contents for Written Report

Category	Problem/Success	Impact	Recommendation
Quality	Use of Table of Contents for Written Report	Building a changeable table of contents allowed for a quicker completion of Written Report	Build a Table of Contents for written report. Keep nearby for a few weeks in order to add or edit sections

The written report is the most time consuming portion of the project. My committee recommended that I use a "moving" table of contents. This made writing the report significantly easier and faster. It allowed me to accelerate my schedule and make extra time for last minute changes and edits. I built an initial table of contents with all major sections I wanted to cover. I then added subsections as I thought about it. Having a hardcopy of the TOC to mark up made it easier to write down a thought if I was away from my computer. I put ideas

under each category and thought through the flow of the paper that way. When it came time to write the report, I had all my thought organized. The writing of the paper went quickly because I already knew what I wanted to say in each section. I originally estimated 40 man-hours to write the paper. Using an outline cut the time down to 28 hours. I recommend this method to be used for any type of lengthy report.

Risk Register moving from 686A to 686B

Category	Problem/Success	Impact	Recommendation
Risk	Insufficient Risk Register during 686B	Schedule overrun, multiple unrealized risks	Update risk register after 686B. There are different risks for execution than project initiation

The risk register is a tool for project managers to use. If not used correctly, the tool is useless and a burden. After 686A, project initiation, is complete. Take a second look at the risk register created. Most of my risks were from planning. This did not help me during execution. I ran into a few major unrealized risks during execution that could have been mitigated if I updated my risk register more frequently. During project execution I measured the success of risk management by looking at the ratio of unrealized risks to realized risks. My goal was 1:1. The final ratio was 2:1. This did not mean my critical path was affected, but it meant I worked much harder to mitigate unrealized risks than I needed to. Those man-hours would have been better spent in other fashions. The result of an insufficient risk register was a schedule overrun and a KPI less than satisfactory.

A MANUAL TO IMPROVE EFFICIENCY IN CONTRACTOR-SUPPLIED QUALITY CONTROL MEASURES ON ASPHALT HEAVY CIVIL CONSTRUCTION PROJECTS ON STATE OF ALASKA-OWNED ROADS

Project Management Plan

Alena Robson

University of Alaska-MSPM

Anchorage, AK

Revision	Date	Changes
1	10/24/14	Creation of Final PMP
2	2/4/15	Updated Key stakeholder register, Updated Requirements Traceability Matrix, Updated Communication Matrix, Updated Project Team
3	2/5/15	Final PMP

Table of Contents

I. Project Objectives

Project Description

This project is being initiated in order to increase the efficiency of contractor-supplied quality control measures on asphalt based State of Alaska owned roads construction projects. The project manager for this project, Alena Robson, has full authority as granted by the sponsor, Amanda Gilliland, to utilize any needed time to complete the project.

In order to accomplish the project goal of increasing efficiency of quality control for contractors, the project manager will produce a manual that will be available to all stakeholders. The manual will primarily focus on improving the efficiency of testing frequencies and on grade sampling techniques but will also include efficient testing and reporting methods for asphalt.

Business Goal

The goal is defined as follows:

Goal:

The business goal of this project is to increase the overall efficiency of contractor quality control for asphalt projects in the State of Alaska in an effort to improve revenue for contractors.

Objective:

- Minimize financial and schedule risks to contractor
- Define specific improvements in the quality control methods
- Increase cost savings on asphalt by 1% for contractor

Project Goals and Objectives

Goals and Objectives are defined as follows:

Goal:

The project goal is to complete a manual for asphalt contractors to utilize during various projects for the State of Alaska by May 2015. If manual is used by contractors, they will have the opportunity to decrease rework of their completed paving projects and increase overall project revenue.

Objective:

- Write a fully scoped Project Management Plan to be used for execution

- Present finalized Project Management Plan to key stakeholders for approval
- Collect relevant data through 10 high-quality interviews
- Properly execute and monitor KPIs to keep project status at green

II. Project Scope Management

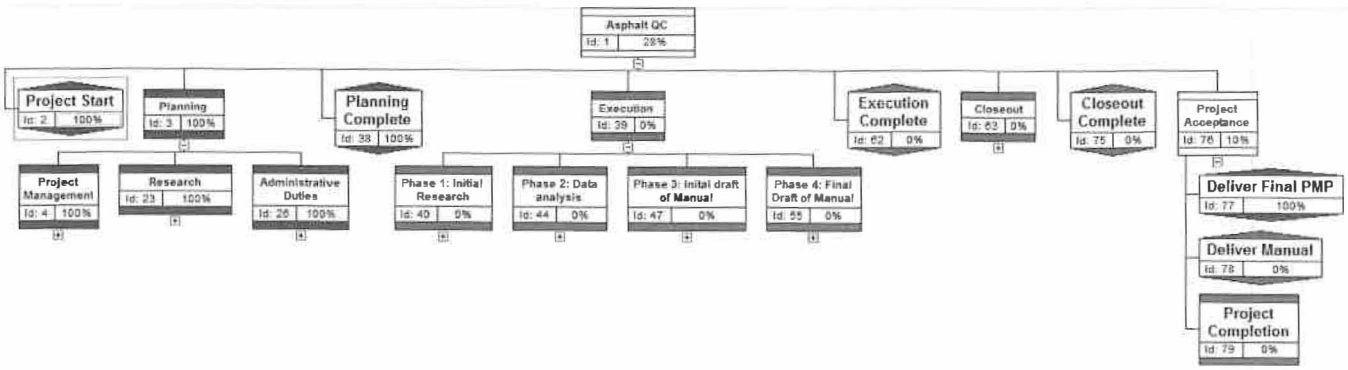
Scope Definition

This project will produce two deliverables: 1. a project management plan that details exactly how the project will be executed and 2. a quality control manual for heavy civil contractors to utilize when completing asphalt projects for the State of Alaska. The manual produced will be approximately 20 pages in length and cover the current method used for effective quality control on State of Alaska asphalt projects, as well as the recommended most efficient contractor quality control measures to use on SOA asphalt projects. The data for this manual will come from interviews with relevant sources and self-conducted literature reviews. This project will begin on September 4th, 2014 and will be completed on May 1st, 2015.

Exclusions:

- The manual will not be an instruction manual on how to conduct asphalt quality control testing procedures
- This project does not include a training program on the use of the manual or a hand-off document
- There will not be a real world test performed by the project manager on the effectiveness of the manual

Project High Level Work Breakdown Structure



Assumptions

- All committee members will communicate in a timely fashion
- The IRB will accept project research methods

Constraints

	Schedule	Scope	Cost (Effort-driven)
Fixed	X		
Somewhat Flexible		X	
Flexible			X

Milestones

Milestone/Deliverable	Target Date
Project Start	**9/4/14**
Planning Complete	**10/11/14**
Presentation of PMP	**12/1/14**
Execution Complete	**4/6/15**
Presentation of Project Deliverables	**4/7/15**
Project Closeout Complete	**4/10/15**
Project Completion	**5/1/15**

III. Stakeholder Identification and Management Plan

Stakeholder Identification

The stakeholders for this project were identified in two ways: internal and external stakeholders. The internal stakeholders, regardless of their influence, are directly involved in the project lifecycle. External stakeholders, regardless of their influence, are not directly involved in the project lifecycle.

Identifying the key stakeholders is pertinent to the success of the project. Once the key stakeholders are identified, their information can be used to gain congruence. The chart below shall be used to gain congruence with the project's stakeholders. The assessment information shall be referenced when any project team member is unsure of a stakeholder's expectation. Refer to the chart during all phases of the project. The Project Manager shall keep the stakeholder register up to date and utilize as necessary.

The following are the identified key stakeholders:

Stakeholder ID		Identification Information				Assessment Information			Classification		
		Organization/Location	Position/Title	Role	Contact Information	Major requirements	Measures of Success	Expectations	Classification (e.g. P/I, P/I, I/I, Salience, etc.)	Current Level of Support	Desired level of support
	Internal Stakeholders										
1	Amanda Gilliland	Knik Construction/ Anchorage	QC Manager	Project Sponsor	amandag@lynden.com	Contacted at each milestone, major changes to the charter, would like to attend presentation of deliverable	Completed deliverable on schedule	Finished product that contractors and the State of AK DOT can utilize	Leading	Medium	High
2	Alena Robson	UAA/Anchorage	Student	Project Manager	907-420-7818, alenarobson@gmail.com	Complete PMP and Final deliverable, align and manage stakeholders, communicate through proper channels, present status updates to key stakeholders	Committee and sponsor approve PMP and support final deliverable	All PPMs will be completed on schedule, individual meetings with key stakeholders are completed throughout project	Leading	High	High
3	Seong Kim	UAA/Anchorage	Faculty	Committee Member	sdkim@uaa.alaska.edu	Provide timely feedback, attend final presentation	PM recieves feedback within 5 days of PPM submission	PPMs submitted on time, final presentation is on schedule	Leading	High	High

Stakeholder Register

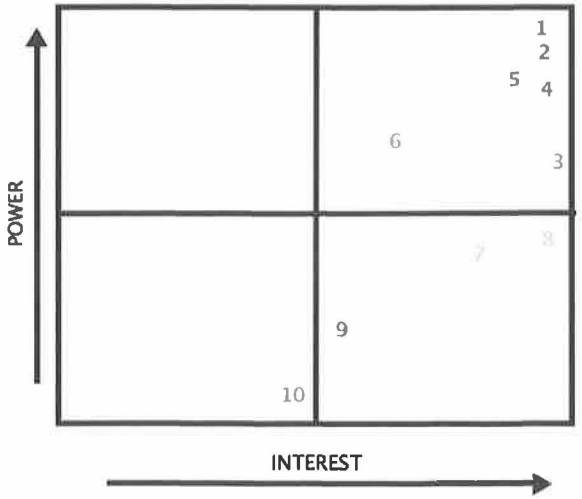
Stakeholder ID		Identification Information				Assessment Information			Classification		
		Organization/Location	Position/Title	Role	Contact Information	Major requirements	Measures of Success	Expectations	Classification (e.g. P/I, P/I, I/I, Salience, etc.)	Current Level of Support	Desired level of support
4	LuAnn Piccard	UAA/Anchorage	Faculty	Committee Member	907-786-1924, luannpiccard2@uaa.alaska.edu	Provide timely feedback, attend final presentation	PM recieves feedback within 5 days of PPM submission	PPMs submitted on time, final presentation is on schedule	Leading	High	High
5	Roger Hull	UAA/Anchorage	Faculty	Primary Advisor	907-786-1923, rkhull@uaa.alaska.edu	Provide timely feedback, attend final presentation	PM recieves feedback within 5 days of PPM submission	PPMs submitted on time, final presentation is on schedule	Leading	High	High
6	PM Administration	UAA/Anchorage	Administrative Support	Project Administration	907-786-1924, msaechao2@uaa.alaska.edu	All administrative duties are completed on time	Administrative duties are met	Contact when an administrative issue arises	Supportive	medium	medium
7	Dan Lindblom	Secon/Juneau	QC Manager	Unoffical Committee Member	907-723-0110, dlindblom@colaska.edu	Facts are legitimate, manual is suitable for all asphalt SOA projects	Interviews are utilized to prove validity,	Will be primarily involved in execution, communicate during the writing of the manual to keep facts legit	Supportive	Medium	Medium
8	Ryan Loomis	CH2MHILL/Anchorage	Project Controls	Student Committee Member	ryan.loomis@ch2m.com	proejct is tracking	PPM's are met	Communicate when issues arise	Supportive	Medium	Medium

Stakeholder Analysis and Requirements

During the execution phase, the project team shall maintain alignment with all key stakeholders. Understanding where each stakeholder holds power and interest for this project will create a successful relationship. The grid shall also be used to identify interrelationships between stakeholders. When an overlap is identified, the project manager shall manage those stakeholders similarly and encourage input from all related parties.

Those stakeholders labeled in red shall be of highest priority for maintaining alignment. Refer to the stakeholder register to identify each stakeholder.

Key stakeholder's power vs. interest in the project:



Maintaining alignment also includes addressing each key stakeholder's requirement. The Requirements Traceability Matrix shall be referenced during all phases of the project. The validation method listed in the matrix shall be used to assess the validity of each stakeholder's requirement. The project manager will note the priority of each requirement, as necessary. This chart shall be a living matrix that may be adjusted as the project manager sees necessary.

Disputes among project team members or between team members and a stakeholder involving stakeholder expectations or requirements will be resolved using the Requirements Traceability Matrix. The requirement and acceptance criteria listed on the document at the time of the dispute shall be considered permanent.

The following defines the requirements of the key stakeholders:

Aspahlt Quality Control Manual Project

Requirements Traceability Matrix

Requirement #	Source	Stakeholder Register Reference	Requirement Description	Requirement Classification	Project Objective Reference	Priority	WBS Work Package Reference	Acceptance Criteria	Validation method	Owner
1	Project Sponsor-Amanda Gilliland	1	Contacted at each milestone, major changes to the charter, would like to attend presentation of deliverable	Business	QC Manual Deliverable	High	1.1, 1.3, 1.5, 1.7, 1.8.1, 1.8.2, 1.8.3	Communication log is updated	Communicaiton log	PM
2	Project Manager-Alena Robson	2	Complete PMP and Final deliverable, align and manage stakeholders, communicate through proper channels, present status updates to key stakeholders	Academic	PMP, Final Deliverable	High	1.8.1, 1.8.2, 1.8.3	PMP and Final Deliverable completed on time, stakeholders satisfied with outcome of project	Stakeholder meetings, use of PM tools for scheduling and tracking	PM
3	Advisor-Roger Hull	5	Provide timely feedback, attend final presentation	Academic	PMP, Final Deliverable	High	1.8.1, 1.8.2, 1.8.3	feedback is returned in a timely fashion; final presentaiton is attended	Feedback is returned within 5 days of PPM submission; PM recieves feedback from final presentation	PM
4	Committee Member-Seong Kim	3	Provide timely feedback, attend final presentation	Academic	PMP, Final Deliverable	High	1.8.1, 1.8.2, 1.8.3	feedback is returned in a timely fashion; final presentaiton is attended	Feedback is returned within 5 days of PPM submission; PM recieves feedback from final presentation	PM
5	Committee Member-LuAnn Piccard	4	Provide timely feedback, attend final presentation	Academic	PMP, Final Deliverable	High	1.8.1, 1.8.2, 1.8.3	feedback is returned in a timely fashion; final presentaiton is attended	Feedback is returned within 5 days of PPM submission; PM recieves feedback from final presentation	PM

Requirement #	Source	Stakeholder Register Reference	Requirement Description	Requirement Classification	Project Objective Reference	Priority	WBS Work Package Reference	Acceptance Criteria	Validation method	Owner
6	PM Administration	6	All administrative duties are completed	Academic	PMP, Final Deliverable	High	1.2.3.2.1, 1.2.3.2.2, 1.2.3.2.3, 1.2.3.2.4	Administrative duties are completed and communicated to PM	Communication log reflects any admin issues or correspondance	PM
7	Dan Lindblom	7	Facts are legitimate, manual is suitable for all asphalt SOA projects	Business	QC Manual Deliverable	High	1.4.3.7, 1.5, 1.8.2	Facts have been verified, manual signed off by sponsor	Meeting with unofficial advisors logged in communication log	PM
8	Ryan Loomis	8	Facts are legitimate, manual is suitable for all asphalt SOA projects	Academic	QC Manual Deliverable	High	1.4.3.7, 1.5, 1.8.3	Facts have been verified, manual signed off by sponsor	communication with student committee logged in communication log	PM
9	Heavy Civil Contractors	9	Deliverable will increase overall profit and increase efficiency in QC, interview participation	Business	QC Manual Deliverable, Interviews	High	1.4.2.1, 1.8.2	Convinced manual will provide positive outcome for contractor	Receive status reports to add comments, participated and logged interviews	PM
10	State of Alaska	10	Contractor will still meet owner requirements, interview participation	Regulatory	QC Manual Deliverable, interviews	Medium	1.4.2.1, 1.8.3	Owner requirments not compromised	Meeting with State of Alaska rep updated in communicaiton log	PM
11	State of Alaska Consulting Firms	11	Contractor will still meet owner requirements, interview participation	Regulatory	QC Manual Deliverable, interviews	Medium	1.4.2.1, 1.8.3	Owner requirments not compromised	Meeting with State of Alaska rep updated in communicaiton log	PM

IV. Project Integration Management Plan

Not applicable to this project

V. Communication Management Plan

Communication Management Approach

The Project Manager will take a proactive role in ensuring effective communications on this project. The communications requirements are documented in the Communications Matrix presented in this plan. The Communications Matrix will be used as the guide for what information to communicate, when to communicate it and to whom to communicate. During project execution, a project communication log will be used to document any major correspondences between stakeholders or project team.

As with most project plans, updates or changes may be required as the project progresses or changes are approved. Changes or updates may be required due to changes in personnel, scope, or other reasons. Additionally, updates may be required as the project matures and additional requirements are needed. The project manager is responsible for managing all proposed and approved changes to the communications management plan. Once the change is approved, the project manager will update the plan and supporting documentation and will distribute the updates to the project team and all stakeholders. This methodology is consistent with the project's Change Management Plan and ensures that all project stakeholders remain aware and informed of any changes to communications management.

Communication Methods

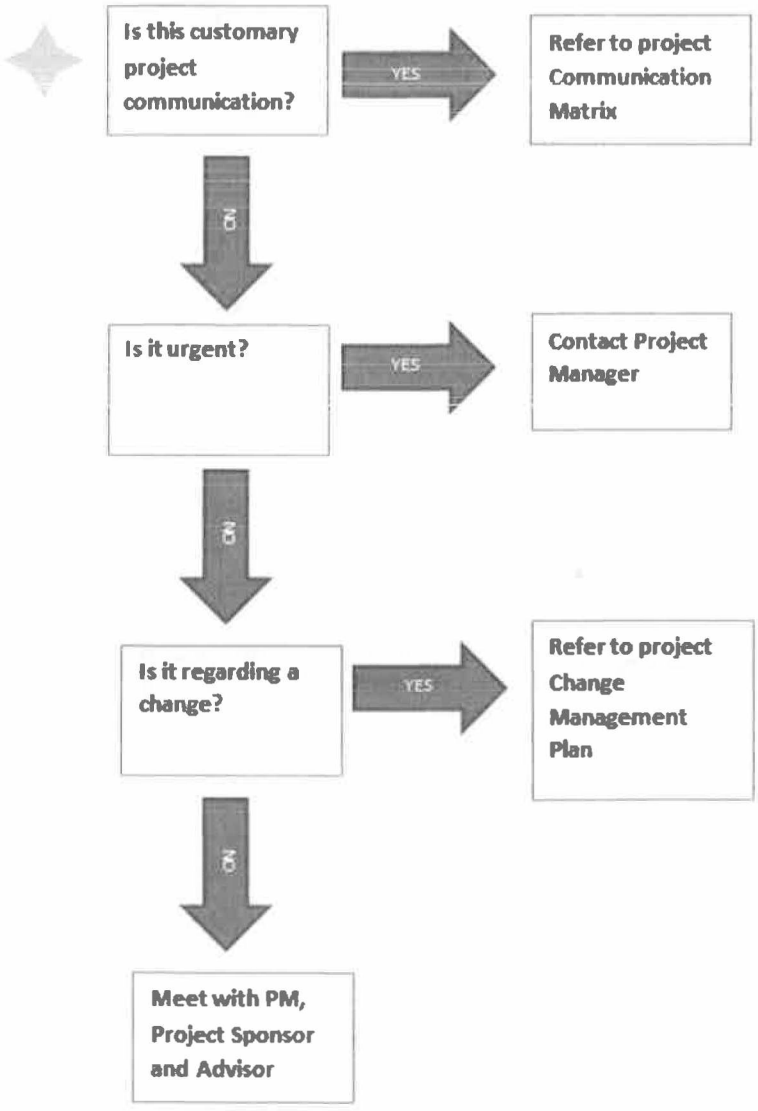
The Communications Matrix for key stakeholders is as follows:

Communication Matrix

Stakeholder ID		Identification Information					Communication		
		Organization	Position/Title	Location	Role	Contact Information	Frequecncy	Level of detail	Format
1	Amanda Gilliland	Knik Construction	QC Manager	Anchorage, AK	Project Sponsor	amandag@lynden.com	Monthly, any change to scope	High Level	text or email
2	Alena Robson	UAA	Student	Anchorage, AK	Project Manager	907-420-7818, alenarobson@gmail.com	As necessary	Detail	email, phone
3	Seong Kim	UAA	Faculty	Anchorage, AK	Committee Member	sdkim2@uaa.alaska.edu	Bi-weekly	Detail	Email, phone
4	LuAnn Piccard	UAA	Faculty	Anchorage, AK	Committee Member	907-786-1924, luannpiccard2@uaa.alaska.edu	Weekly phone meeting at min., contact with quesitons,	Detail	Email, phone
5	Roger Hull	UAA	Faculty	Anchorage, AK	Primary Advisor	907-786-1923, rkhull@uaa.alaska.edu	Weekly phone meeting at min., contact with quesitons,	Detail	Email, phone
6	PM Administration	UAA	Administrative Support	Anchorage, AK	Project Administration	907-786-1924, msaechao2@uaa.alaska.edu	as needed	High Level	email, phone
7	Dan Lindblom	Secon	QC Manager	Juneau, AK	Unoffical Committee Member	907-723-0110, dlindblom@colaska.edu	as needed during planning phase; weekly during execution	detail	email, phone
8	Ryan Loomis	CH2MHILL	Project Controls	Anchorage, AK	Student Committee	ryan.loomis@ch2m.com	as needed	detail	email

The communication flow chart below was created to aid in project communication. This flow chart provides a framework for the project team to follow for this project. However, there may be occasions or situations which fall outside of the communication flow chart where additional clarification is necessary. In these situations the Project Manager is responsible for discussing the communication with the project advisor and project sponsor before making a determination on how to proceed.

The communication flow chart is as follows:



VI. Quality Management Plan

Quality Management Approach

The Quality Management Plan for this project will establish the activities, processes, and procedures for ensuring a quality product upon the conclusion of the project.

Metrics will be established and used to measure quality throughout the project life cycle for the product and processes. These product and process measurements will be used as one criterion in determining the success of the project and must be reviewed by the project sponsor. Metrics will include: CPI as an effort driven measurement and stakeholder satisfaction.

Quality Management Tools and Techniques

Microsoft Project management will be used for all scheduling and monitoring activities during the life of the project. Microsoft WBS Chartpro will be used for the creation and monitoring of all work breakdown structures.

Quality Assurance

The quality assurance of this project focuses on the processes used in the manufacturing Manual. In order to ensure quality, a repetitive process will be utilized. This iterative process includes measuring process metrics, analyzing process data, and continuously improving the processes.

The project manager will perform assessments at planned intervals throughout the project to ensure all processes are being correctly implemented and executed.

The Key Performance Indicators are as follows:

CPI

The cost performance indicator will be reported on a monthly basis and depicted as a histogram. The graph will be updated on the 1st of each month with the cumulative CPI. The project threshold will be considered 0.8 < 1.0 >1.2. If a CPI of 0.8 or below is calculated at any point during the project lifecycle, a committee meeting must be called in order to discuss the method and timeline to bring project back into compliance.

Key Stakeholder Satisfaction

Stakeholder Satisfaction will be measured monthly using the below satisfaction scale:

Please respond:

On a scale from 1-10, how satisfied are you with the overall progress of the project including communication methods used?

Very Unsatisfied Very Satisfied

The satisfaction scale will be distributed to the key stakeholders on the 1st of each month. The response will be due on the 10th of each month. After the majority of data is collected on the 10th, a histogram graph will depict the average of the months' responses. The minimum project threshold for stakeholder satisfaction will considered 80%. If stakeholder satisfaction falls below 80% at any point during the project lifecycle, a key stakeholder meeting must be called to discuss the method and timeline to bring project back into compliance.

VII. Risk Management Plan

Risk Identification

It is understood that there are risks associated with every project. Many are identified risks and others are unidentified. The project manager insured adequate time was allocated risk identification. Project risks were identified through expert opinions from committee members, student advisors and the project manager. It is important to the health of the overall project that risks in all phases of the project lifecycle were identified. The risks will be monitored and controlled in accordance to the risk register and the risk management plan. As the risk register is reviewed, it shall be noted that risks are categorized in two ways: First, by external and internal risks and second by risk level. It will be assumed red relates to high level risks, yellow relates to medium level risk and green relates to low level risks.

The risk register for external risks is as follows:

Risk Register							
ID #	Risk Name	Description of Risk	Liklihood	Impact	Risk Level	Response Type	Owner
External Risks (Conditions outside the control of the project)							
1.2.1.2.5	PMP	PMP not approved by Sponsor	Medium	High	High	Mitigate; Check in with sponsor throughout planning process	Sponsor
1.8.3, 1.6.1.2	Deliverable, final report	Computer Crashes	Low	High	High	Mitigate; back up all work to cloud	PM
1.4.1.2	Research	Alaska-Specific Data must be seen in-person	High	High	High	Accept; schedule trip to Alaska	PM
1.4.2.1	Research	Interviewees fail to schedule	Medium	Medium	Medium	Mitigate; keep in contact with interviewees	PM
1.4, 1.8.3	Project Execution, completion	Project manager becomes Ill	High	Low	Medium	Mitigate; build schedule to finish early, when time is available work toward finishing critical tasks	PM
1.3, 1,5, 1.7, 1.8.3	Project Completion	Family Emergency of committee member or PM	Low	Low	Low	Accept; delay project if severe enough	Committee, PM
1.4.3.7	Deliverable	Committee members do not communicate on time	Medium	Low	Low	Mitigate; communicate early and often	Committee, PM

The risk register for internal risks is as follows:

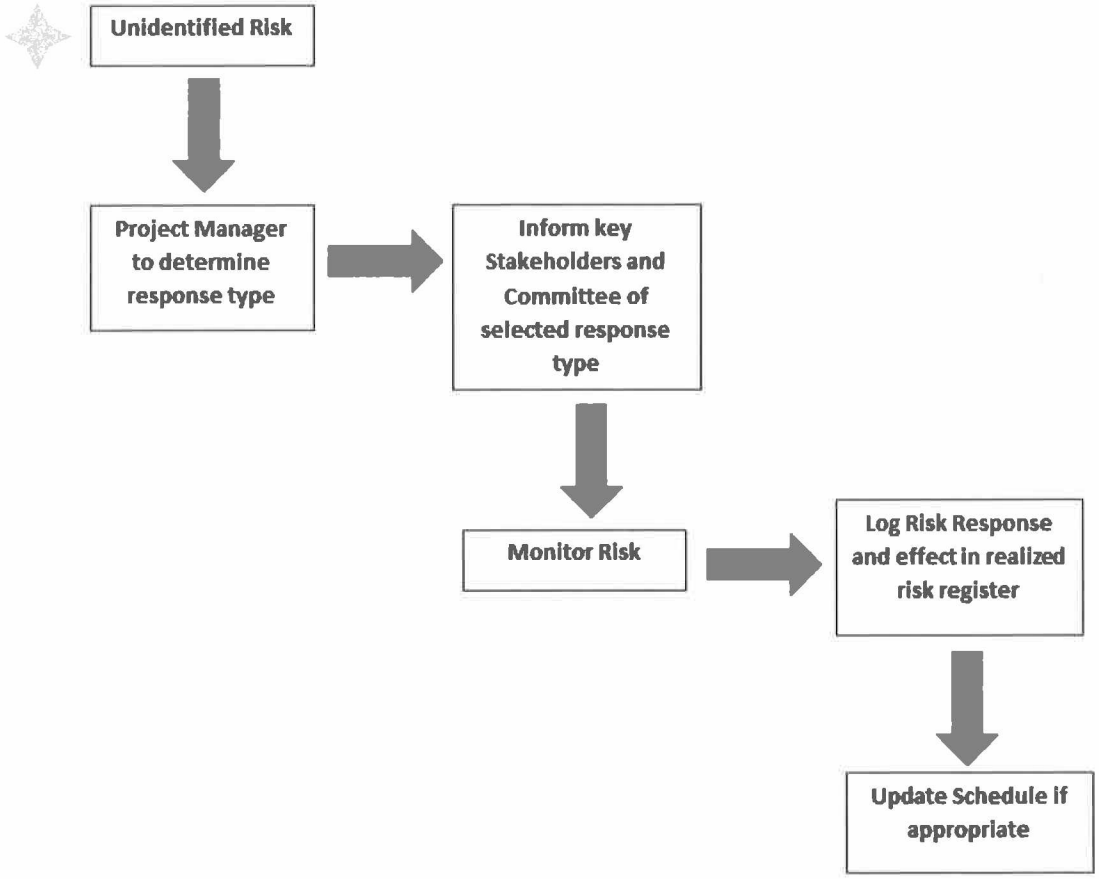
Risk Register							
ID #	Risk Name	Description of Risk	Liklihood	Impact	Risk Level	Response Type	Owner
Internal Risks (Conditions within the control of the project)							
1.8.3	Project Completion	PM Defers	Medium	High	High	Accept; rebaseline	PM
1.4.2.2	Research	Lack of data	Medium	High	High	Mitigate; determine sources during planning phase, meet with UAA research librarians	PM
1.4.4.6	Execution	PM changes Manual sequencing	High	High	High	Mitigate; allow for extra time during manual writing process, follow change control process	PM
1.8.3	Project Completion	Project not complete on time	High	Medium	High	Mitigate; Use SPI as KPI, utilize comments from committee	PM
1.4	Project Execution	Project changes from deliverable based project to research based project	High	High	High	Mitigate; track risk with log, continued communicaiton with sponsor, keep interviewees on track with pre-determined quesitons	PM
1.8.3	Slippage	Project Manager does not prioritize time	Medium	Medium	Medium	Accept; crash tasks	PM
1.8.2	Project Completion	Project Manager takes vacation	High	Low	Medium	Mitigate; schedule built to accommodate planned vacations	PM
1.7	Closeout	Delay in Closeout	Low	Low	Low	Mitigate; collect lessons learned throughout execution process	PM

Risk Response Measures

Identified risks will be monitored and controlled according to the risk register. Those risks deemed high level, will be tracked throughout the execution process with a risk mitigation log. The risk mitigation log will be made available to all committee members and stakeholders when changes are made. As identified risks arise, the response measure listed on the risk register shall be used and also tracked on the risk mitigation log. Risks associated with a mitigated risk response have been incorporated into this project management plan and supporting documents.

Unidentified risks are assumed to be risks not identified on the risk register. These risks will be monitored in the same way as identified risks. Using the risk mitigation log, unidentified risks will be logged, the appropriate response and project effect documented.

Unidentified risks will be controlled in the following way:



VIII. Cost Management Plan

There are no outside costs associated with this project. All incurred costs will be covered by the project manager.

IX. Time Management Plan

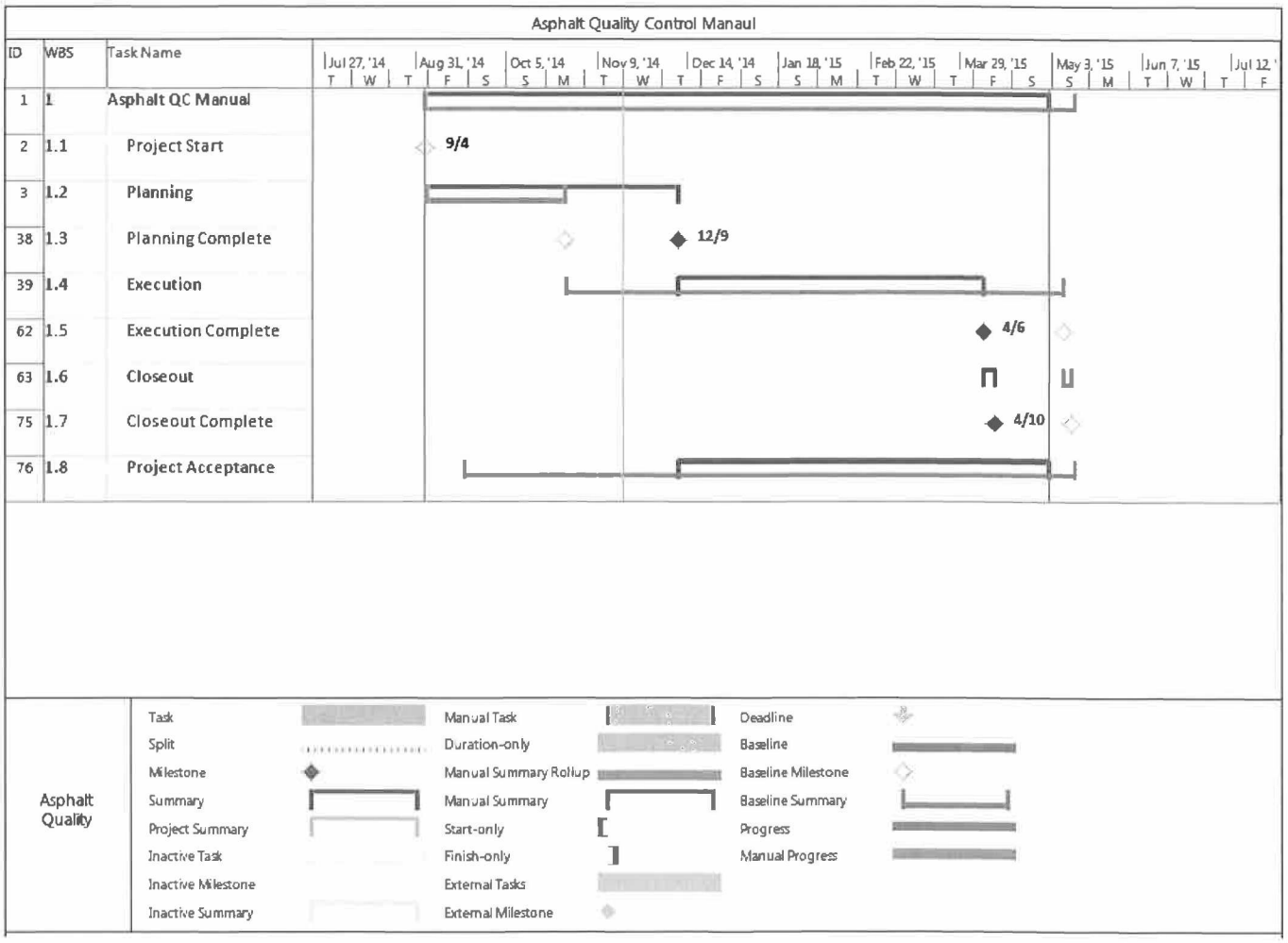
Task Identification

The tasks for the project Gantt chart were estimated using previous experiences by the project manager and by consulting with the student advisor. All tasks in the project schedule represent all of the work defined in the scope and will be completed by project completion.

Schedule Tracking

The project schedule will be used to keep the project tracking. As progress moves forward, the project manager will update the Gantt chart. A biweekly project schedule update will be presented to stakeholders during the execution phase.

A full project schedule can be found in the Appendix section. The summarized project schedule baseline is as follows:



X. Procurement Management Plan

Not applicable to this project

XI. Human Resources Management Plan

Roles and Responsibilities

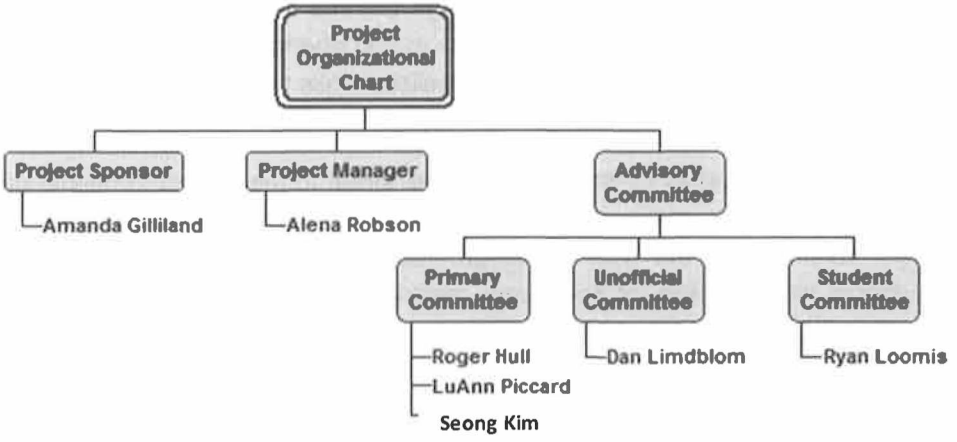
The roles and responsibilities are essential to project success. All team members must clearly understand their roles and responsibilities in order to successfully perform their portion of the project. The following project team roles and responsibilities have been established:

Role	Responsibility
Project Manager	Manage project and complete all deliverables
Project Sponsor	Accept final project deliverables
Primary Advisory Committee	Advise project manager during all phases of project
Unofficial Committee	Advise project manager on validity of topic facts

Project Team

The project team will be consistent throughout the lifecycle of the project. Any proposed changes to the project team will follow the project's change control process.

The following chart defines the organizational nature of the project team:



XII. Change Management Plan

Project Change Definition

Depending on the type of proposed change, changes to project documentation and the communication of these changes will be required to include any approved changes into the project plan and ensure all stakeholders are notified.

Types of project changes include:

Scheduling Changes: changes which will impact the approved project schedule. These changes may require fast tracking, crashing, or re-baselining the schedule depending on the significance of the impact.

Scope Changes: changes which are necessary and impact the project's scope which may be the result of unforeseen requirements which were not initially planned for. These changes may also impact the schedule. These changes may require revision to WBS, project scope statement, and other project documentation as necessary.

There are several types of changes which may be requested and considered for this project. Not all changes will need to follow the complete change control process.

Project Change Thresholds

Type I: This change type shall be considered a high threat to the project schedule or to the project scope. Changes of this category require the use of the Change Control Board. Examples of this type of change includes: scope changes, rebaselining decisions, addition of major work packages, unrealized risks that impact schedule or scope, high risk and high impact realized risks, etc.

Type II: This change type shall be considered a low threat to the project schedule or to the project scope. Changes of this category *do not* require the use of the Change Control Board. Examples of this type of change includes: scope changes that do not impact the critical path, medium or low impact realized or unrealized risks, etc.

Change Control Board

The Change Control Board (CCB) is the approval authority for all proposed change requests pertaining to this project. The purpose of the CCB is to review all change requests, determine their impacts on the project risk, scope, and schedule, and to approve or deny each change request. The following chart provides a list of the CCB members for this project:

Name	Project Role	CCB Position
Alena Robson	Project Manager	Lead Chairman
Amanda Gilliland	Project Sponsor	Chairman
Roger Hull	Advisor	Chairman

LuAnn Piccard	Committee Member	Chairman
Seong Kim	Committee Member	Chairman

As change requests are submitted to the Project Manager by the project team/stakeholders, the Project Manager will log the requests in the change log and then communicate to those listed above to review the change request. For a change request to be approved, all CCB members must vote in favor. In the event more information is needed for a particular change request, the request will be deferred and sent back to the requestor for more information or clarification. If a change is deemed critical, the change will take priority and will be reviewed by the CCB members within 24 hours.

Change Control Process

The Change Control Process for the project will follow the organizational standard change process for all projects. The project manager has overall responsibility for executing the change management process for each change request.

1. Identify the need for a change (Stakeholders) – Change requestor will submit a completed change request form to the project manager. This will be provided upon request by the project manager.
2. Evaluate the change (Project Manager, Team, Requestor) – The project manager will conduct a preliminary analysis on the impact of the change to risk, schedule, and scope and seek clarification from committee members and the change requestor.
3. Submit change request to CCB (Project Manager) – The project manager will submit the change request, as well as the preliminary analysis, to the CCB for review.
4. Obtain Decision on change request (CCB) – The CCB will discuss the proposed change and decide whether or not it will be approved based on all submitted information.
5. Implement change (Project Manager) – If a change is approved by the CCB, the project manager will update and re-baseline project documentation as necessary.

XIII. Project Closeout

Project Planning Closeout

The project planning closeout shall be conducted after the completion of the project planning process. The planning closeout shall include lessons learned from the closeout phase. The lessons learned will be compiled in a project repository for use on future projects.

Project Execution Closeout

The project execution closeout shall be conducted after the completion of project execution. The execution closeout shall include:

- Schedule closeout
- Quality review closeout
- Conduct project acceptance review
- Conduct administrative closeout

XIV. Appendices

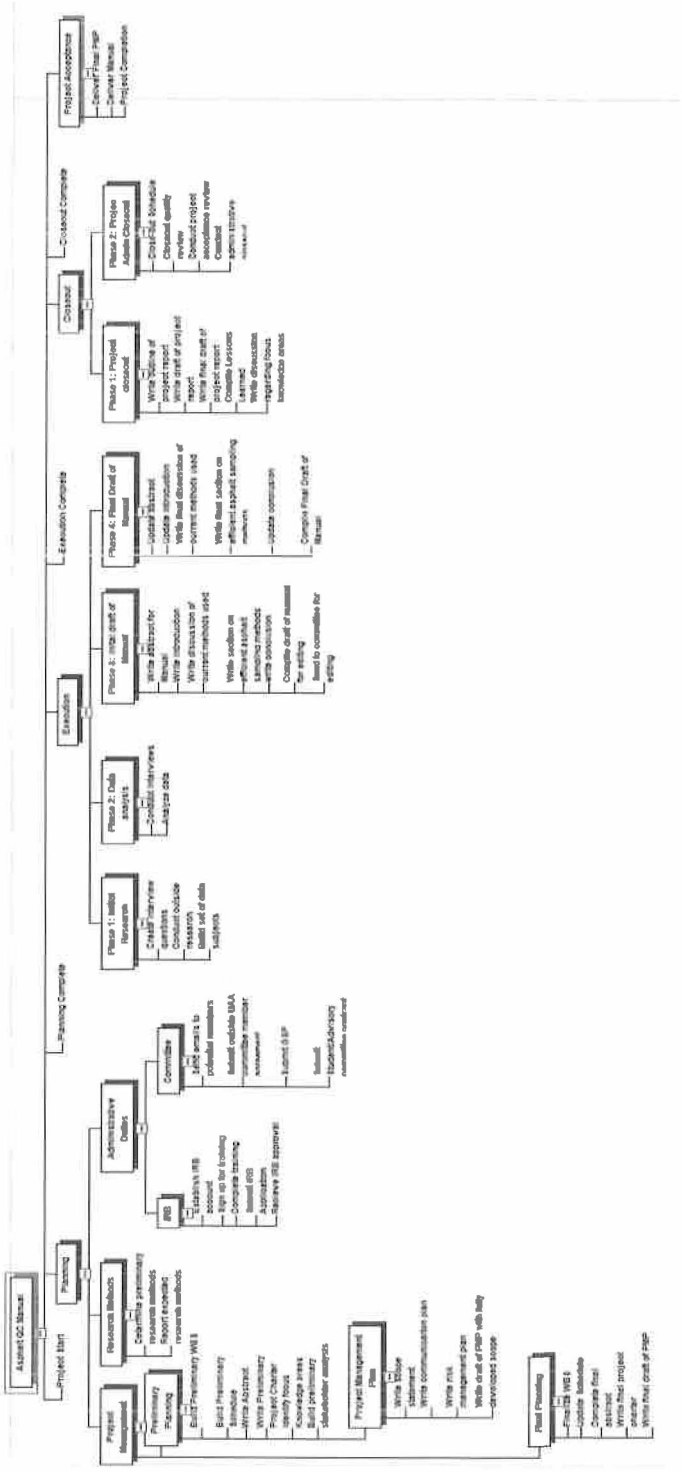
A MANUAL TO IMPROVE EFFICIENCY IN CONTRACTOR-SUPPLIED QUALITY CONTROL MEASURES ON ASPHALT HEAVY CIVIL CONSTRUCTION PROJECTS ON STATE OF ALASKA-OWNED ROADS

ABSTRACT

On asphalt heavy civil construction projects, the State of Alaska requires contractors to follow specific quality standards for heavy civil asphalt construction projects. Contractors must complete project work to meet customer requirements and conform to quality standards in an efficient and cost effective manner. Doing so ensures that the State of Alaska's quality standards are met and contractors' financial and schedule targets can be achieved with the most efficient use of scarce resources. Currently, there is an indirect cost savings to the contractor to perform their QC in a specific manor because it reduces or in some cases eliminates rework. The desired state is to directly save money by applying efficient quality control methods. This project will produce a manual that describes best practices and quality control procedures that can be applied by heavy civil asphalt construction contractors to meet necessary SOA quality standards in a more timely, cost effective and efficient way. The correct application of this manual might result in a savings of 1% on the bid cost per asphalt ton.

Key Words: State of Alaska, quality control, Asphalt Construction, Asphalt Contractors

Full Project WBS



Project Sponsor Letter

KNIK CONSTRUCTION

6400 South Airpark Drive
Anchorage, Alaska 99502
Office: (907) 245-1865
Fax: (907) 245-1744

September 9, 2014

University of Alaska Anchorage
Project Management Department
University Center, Room 155
3901 Old Seward Highway
Anchorage, AK 99503

Attention: Roger Hull

Subject: Alena Robson Support Statement for Master of Science in Project Management

Mr. Hull,

The purpose of this letter is to express my support as a sponsor for Alena's capstone project topic: A manual to Improve Efficiency in Contractor-Supplied Quality Control Measures on Asphalt Heavy Civil Construction Projects on State of Alaska-Owned Roads. As Quality Control Manager for a heavy civil construction company, I understand the current stringent and often unnecessary quality control requirements for State of Alaska Department of Transportation projects. Finding ways to optimize efficiency for quality control, without jeopardizing the quality of the project are of great interest. Creating a manual that covers this topic would be a valuable tool for both contractors and the Agency.

Sincerely,

Amanda Gilliland
Quality Control Manager
Knik Construction Co., Inc.

Status Reports

One Page PM 686A Project Status Report Dashboard

Name: Alena Robson Date: September 19th 2014

Project Title: Manual for Efficient Quality Control Measures on State of Alaska Asphalt Projects

Synopsis of Project	**Progress Since Last Report**
•To research prior effective methods of contractor quality control on Alaskan asphalt projects and determine if they continue to be effective *•To conduct a series of interviews with stakeholders directly involved in asphalt quality control* *•To analyze data collected from interviews and self-conducted research* *•To create a manual from analyzed data that outlines the most efficient and effective way to conduct contractor based quality control measures on State of Alaska-owned asphalt construction projects* •To report findings to project sponsor and other high level stakeholders in May 2015	• *Project has been initiated* • *Project Sponsor secured* • *Preliminary schedule and WBS completed* • *Committee created*
Current Status	**Forecast**
• *Initial Schedule, WBS, Project Charter finished* • *Initial stakeholder analysis complete.* • *Abstract written and scope statement started* • *GSP submitted to MSPM admin. Waiting on approval for outside UAA committee member.* • *On track for next PPM* • *Awaiting any feedback from advisor on PPM 1*	• *Revising project schedule to account for over allocated resources.* • *Deciding on research methods by communicating with committee.* • *Risk Analysis to be started* • *Finalize scope statement* • *Table of contents to be written for next PPM*
Anticipated Changes/Key Risks/Corrective Actions	**Key Takeaways/Where Help Needed**
• *Will need to account for planned vacations in schedule* • *Planning process may take longer than anticipated*	• *Continue updating schedule;* • *Be sure to log risks and changes on separate logs.* • *Need help from committee narrowing scope statement* • *Would like to narrow research methods, but need assistance in understanding which one works best for my project*

One Page PM 686A Project Status Report Dashboard

Name: Alena Robson Date: 10/7/14

Project Title: MANUAL TO PROVIDE EFFICIENT ASPHALT QC MEASURE ON STATE OF ALASKA PROJECTS

Synopsis of Project	**Progress Since Last Report**
This project will produce two deliverables: 1. a project management plan that details exactly how the project will be executed and 2. a quality control manual for heavy civil contractors to utilize when completing asphalt projects for the State of Alaska. The manual produced will be approximately 30 pages in length and cover the current method used for effective quality control on State of Alaska asphalt projects, as well as the recommended most efficient contractor quality control measures to use on SOA asphalt projects. The data for this manual will come from interviews with relevant sources and self-conducted literature reviews. This project will begin on September 4th, 2014 and will be completed on May 1st, 2015.	• Initial research methods plan • IRB training complete • Requirements clearly defined • Preliminary Risks Identified • Draft PMP writing has begun • Stakeholder communications are consistent and logged
Current Status	**Forecast**
Currently, I have completed all tasks for PPM2 and begun PPM 3 deliverables. Current status is green.	Project will continue to stay in the green status quadrant largely due to the IRB training that is complete and the start of a draft PMP. Identified risks will be monitored due to nature of project progression
Anticipated Changes/Key Risks/Corrective Actions	**Key Takeaways/Where Help Needed**
Unidentified Internal Risk: • Project Manager changed work schedule Response: • Accept; move available working time slot ahead 1 hour No corrective action needed at this time	• Utilize stakeholder's availability correctly • Research best way to have stakeholders view draft of PMP (all at once or in pieces)

One Page PM 686A Project Status Report Dashboard

Name: Alena Robson Date: 11/7/14

Project Title: MANUAL TO PROVIDE EFFICIENT ASPHALT QC MEASURE ON STATE OF ALASKA PROJECTS

Synopsis of Project	Progress Since Last Report
This project will produce two deliverables: 1. a project management plan that details exactly how the project will be executed and 2. a quality control manual for heavy civil contractors to utilize when completing asphalt projects for the State of Alaska. The manual produced will be approximately 30 pages in length and cover the current method used for effective quality control on State of Alaska asphalt projects, as well as the recommended most efficient contractor quality control measures to use on SOA asphalt projects. The data for this manual will come from interviews with relevant sources and self-conducted literature reviews. This project will begin on September 4th, 2014 and will be completed on May 1st, 2015.	• Draft of PMP complete • IRB submission complete • Requirements clearly defined • Product deliverables clearly defined • Research methods finalized • Stakeholder communications are consistent and logged • Received a GO decision on first checkpoint
Current Status	**Forecast**
Currently, I have completed all tasks for PPM3 and begun PPM 4 deliverables. Current status is green.	Project will continue to stay in the green status quadrant largely due to the fact the IRB submission is complete and final presentation documents are underway. Identified risks will be monitored due to nature of project progression.
Anticipated Changes/Key Risks/Corrective Actions	**Key Takeaways/Where Help Needed**
Unidentified Internal Risk: • Project Manager changed work schedule Response: • Accept; move available working time slot ahead 1 hour Unidentified Internal Risk • Interview questions inadequate for use Response: • Accept; crash task to build sufficient research questions for use No corrective action needed at this time	• Utilize stakeholder's availability correctly • Edits to finalize PMP and presentation • Research most effective presentation style

One Page PM 686B Project Status Report Dashboard

Name: Alena Robson Date: January 23, 2015

Project Title: Asphalt Quality Control on State of Alaska DOT Projects

Synopsis of Project	Progress Since Last Report
Contractors face financial and scheduling risks if they do not address the DOT quality control standards effectively. Contractors must complete project work to meet customer requirements and conform to quality standards in an efficient and cost effective manner. Doing so ensures that the State of Alaska's quality standards are met and contractors' financial and schedule targets can be achieved with the most efficient use of scarce resources. Currently, there is an indirect cost savings to the contractor to perform their QC in a specific manor because it reduces or in some cases eliminates rework. The desired state is to directly save money by applying efficient quality control methods. This project will produce a manual that describes best practices and quality control procedures that can be applied by heavy civil asphalt construction contractors to meet necessary SOA quality standards in a more timely, cost effective and efficient way.	• Project Management Plan finalized and accepted by Sponsor and Committee. • Research questions finalized, IRB approved, and interviews scheduled and 50% complete • Risk register updated. • Schedule has been updated
Current Status	**Forecast**
The project currently has a CPI of 1.02 and a stakeholder satisfaction rating of 9. I am scheduled to complete data collection on time. Current project status is Green.	This project is tracking to meet the PPM 1 deadline. Committee team will be changing for execution process, may affect stakeholder satisfaction. PM has member in mind that they would like to add, but still needs coordination.
Anticipated Changes/Key Risks/Corrective Actions	**Key Takeaways/Where Help Needed**
Unrealized risks: 1. Interviewee's changed schedule of interview Response: Accepted risk. No affect to critical path or data collection critical path. 2. PM took unscheduled vacation Response: Crashed tasks to keep project on schedule 3. Major internal stakeholder has changed: Need to add new committee member to team Response: Accept; Contact current committee team and ask for change approval. Then will add committee member and bring up to speed as soon as possible. Realized Risks: 1. PM has taken multiple planned vacations Response: Schedule accommodated for planned vacations	• Risk register has proven to be sufficient thus far and realized risks have not made a major impact to the schedule. • Project manager has scheduled meetings with committee member and is in process of finding new committee member for execution process. PM will need responses from other committee members to approve change. Look for that this week. • Interview data analysis is coming up in for next status update. Slated to begin on time, exact plan to be coordinated with advisor.

One Page PM 686B Project Status Report Dashboard

Name: **Alena Robson** Date: **February 13th, 2015**

Project Title: **Asphalt Quality Control on State of Alaska DOT Projects**

Synopsis of Project	**Progress Since Last Report**
Contractors face financial and scheduling risks if they do not address the DOT quality control standards effectively. Contractors must complete project work to meet customer requirements and conform to quality standards in an efficient and cost effective manner. Doing so ensures that the State of Alaska's quality standards are met and contractors' financial and schedule targets can be achieved with the most efficient use of scarce resources. Currently, there is an indirect cost savings to the contractor to perform their QC in a specific manor because it reduces or in some cases eliminates rework. The desired state is to directly save money by applying efficient quality control methods. This project will produce a manual that describes best practices and quality control procedures that can be applied by heavy civil asphalt construction contractors to meet necessary SOA quality standards in a more timely, cost effective and efficient way.	• Project Management Plan finalized and accepted by Sponsor and Committee. • Data Complete • Data analysis has begun • Committee members finalized • GSP complete • Schedule updated • Risks documented • Communication log updated • Change control process in place
Current Status	**Forecast**
The project currently has a CPI of 1.0 and a stakeholder satisfaction rating of 85%. I am scheduled to complete data collection on time. Current project status is Green.	Data analysis is upcoming task. Methods have changed, but new plan is in place. Research plan updated. Will be coding interviews and still using bar graph. No major risks are foreseen in the future.
Anticipated Changes/Key Risks/Corrective Actions	**Key Takeaways/Where Help Needed**
Unrealized risks: • Data analysis means and methods has changed. Response: discuss ideas with all committee members. Come to conclusion Realized Risks: none	• Data analysis will take longer than originally expected, but no change to critical path • Discussion with key stakeholders continues to play a large role in project success • I need help in determining format of required written paper

One Page PM 686B Project Status Report Dashboard

Name: **Alena Robson** Date: **March 6th, 2015**

Project Title: **Asphalt Quality Control on State of Alaska DOT Projects**

Synopsis of Project	**Progress Since Last Report**
Contractors face financial and scheduling risks if they do not address the DOT quality control standards effectively. Contractors must complete project work to meet customer requirements and conform to quality standards in an efficient and cost effective manner. Doing so ensures that the State of Alaska's quality standards are met and contractors' financial and schedule targets can be achieved with the most efficient use of scarce resources. Currently, there is an indirect cost savings to the contractor to perform their QC in a specific manor because it reduces or in some cases eliminates rework. The desired state is to directly save money by applying efficient quality control methods. This project will produce a manual that describes best practices and quality control procedures that can be applied by heavy civil asphalt construction contractors to meet necessary SOA quality standards in a more timely, cost effective and efficient way.	• Manual (deliverable) complete • Data Analysis complete • Outline of final paper complete • Written Report 40% complete • Schedule updated • Risks documented • Communication log updated
Current Status	**Forecast**
The project currently has a CPI of .98 and a stakeholder satisfaction rating of 91%. I am scheduled to complete data collection on time. Current project status is Green.	Moving forward with writing process. Expected to have draft finished by March 20th deadline. Manual will be submitted on March 20th as well.
Anticipated Changes/Key Risks/Corrective Actions	**Key Takeaways/Where Help Needed**
Unrealized risks: • Outline for written paper continues to change. Did not plan for a ever changing task, will take longer to complete written paper. Response: Focus MH on task, mitigated by starting task earlier Realized Risks: • PM changed sequencing of Manual Response: Extra time was planned for manual rework. Project Sponsor is closely involved	• Outline of paper is vital • Writing process is where effort needs to be focused • Discussion with key stakeholders continues to play a large role in project success

One Page PM 686B Project Status Report Dashboard

Name: **Alena Robson** Date: **April 3rd, 2015**

Project Title: **Asphalt Quality Control on State of Alaska DOT Projects**

Synopsis of Project	**Progress Since Last Report**
Contractors face financial and scheduling risks if they do not address the DOT quality control standards effectively. Contractors must complete project work to meet customer requirements and conform to quality standards in an efficient and cost effective manner. Doing so ensures that the State of Alaska's quality standards are met and contractors' financial and schedule targets can be achieved with the most efficient use of scarce resources. Currently, there is an indirect cost savings to the contractor to perform their QC in a specific manor because it reduces or in some cases eliminates rework. The desired state is to directly save money by applying efficient quality control methods. This project will produce a manual that describes best practices and quality control procedures that can be applied by heavy civil asphalt construction contractors to meet necessary SOA quality standards in a more timely, cost effective and efficient way.	• Written report draft complete and submitted • Deliverable complete • Presentation Planning begun • Key stakeholders are informed more often at this stage than before
Current Status	**Forecast**
The project currently has a CPI of .99 and a stakeholder satisfaction rating of 89%. I am scheduled to complete data collection on time. Current project status is Green.	Final paper due in one week. Project presentation is scheduled to be completed on time. PM feels the target dates will be met. No upcoming issues
Anticipated Changes/Key Risks/Corrective Actions	**Key Takeaways/Where Help Needed**
Unrealized risks: • PM did not know about PMI formatting. Research had to be completed before paper was continued Response: Mitigated by having resources on hand already and reviewed other examples Realized Risks: none	• Presentation focus • Examples will aim to help stakeholders understand topic better

IRB Documentation

Project Overview

[679236-1] A Manual to Improve Efficiency in Contractor-Supplied Quality Control Measures on Asphalt Heavy

You have Full access to this project. (Edit)

Research Institution University of Alaska Anchorage, Anchorage, AK

Title A Manual to Improve Efficiency in Contractor-Supplied Quality Control Measures on Asphalt Heavy Civil Construction Projects on State of Alaska-Owned Roads

Principal Investigator Robson, Alena, BS

Sponsor Amanda Gilliland

The documents for this project can be accessed from the **Designer**.

Project Status as of: 11/21/2014

Reviewing Board	Initial Approval Date	Project Status	Expiration Date
University of Alaska Anchorage IRB, Anchorage, AK	11/20/2014	Active	11/20/2015

Package 679236-1 is: Locked

Package 1 of 1 | Jump

Submitted To	Submission Date	Submission Type	Board Action	Effective Date	
University of Alaska Anchorage IRB, Anchorage, AK	11/05/2014	New Project	Approved	11/20/2014	Review Details

Shared with the following users

User	Organization	Access Type
Hull, Roger	University of Alaska Anchorage, Anchorage, AK	Full
Robson, Alena	University of Alaska Anchorage, Anchorage, AK	Full

Committee Documentation

Roger K Hull September 1, 2014 11:38 AM
To: Alena Robson <alrobson2@alaska.edu> Hide Details
Cc: UAA ESM & PM Program Support <UAA_pm@uaa.alaska.edu>, Megan H Poulson
Re: PM686A Advisory Committee

Alena,
I would be glad to serve either as your Primary Advisor or on your Committee for your PM686 Capstone Project.
I'm available anytime if you'd like to discuss your topic.
Regards,
Roger

Roger Hull
907-786-1923
rkhull@uaa.alaska.edu

See More from Alena Robson

RE: Committee Member

Seong Dae Kim <sdkim2@uaa.alaska.edu>

This message has been replied to or forwarded.

Sent: Fri 1/23/2015 6:39 PM
To: Alena Robson

Alena,

I would love to serve in your committee.
I talked about this in my PM application tools class but I'm personally working on a new road striping method project and this may be relevant to your work.
Phone conversation would be fine but status update via e-mail is also OK for me.

Best,

Prof. Kim

LuAnn Piccard September 4, 2014 3:50 PM
To: Alena Robson
RE: PM 686 Advisory Committee Inbox - alenarobson@gmail.com

Hi Alena,

I would feel privileged to serve on your committee. I have truly enjoyed seeing you grow in your capabilities and confidence these past couple of years. Roger and I were just talking about you today and how you are "hitting it out of the park". Great job. I look forward to working with you. Your topic is not one I have a lot of background in, so please let me know what particular areas you feel I can contribute most to your success.

Warm regards,

LuAnn Piccard, PMP
Department Chair, Engineering Science and Project Management (ESPM)
School of Engineering
University of Alaska Anchorage
University Center 155C
Phone: 907.786.1917 (office)
Cell: 970.443.1917 (Colorado Area Code)
Fax: 907.786.1935
email: lpiccard@uaa.alaska.edu

See More from Alena Robson

A MANUAL TO IMPROVE EFFICIENCY IN CONTRACTOR-SUPPLIED QUALITY CONTROL MEASURES ON ASPHALT HEAVY CIVIL CONSTRUCTION PROJECTS ON STATE OF ALASKA-OWNED ROADS

Project Charter

Alena Robson

PM 686 Capstone Project

MSPM University of Alaska Anchorage

Spring 2015

Contents

Section 1. Project Overview

1.1 Project Description

This document defines this project and details at a high level. This project is being initiated in order to increase the efficiency of contractor-supplied quality control measures on asphalt based State of Alaska owned roads construction projects. The project manager for this project, Alena Robson, has full authority as granted by the sponsor, Amanda Gilliland, to utilize any needed time to complete the project.

In order to accomplish the project goal of increasing efficiency of quality control for contractors, the project manager will produce a manual that will be available to all stakeholders. The manual will primarily focus on improving the efficiency of sampling.

1.2 Project Scope

This project will produce two deliverables: 1. a project management plan that details exactly how the project will be executed and 2. a quality control manual for heavy civil contractors to utilize when completing asphalt projects for the State of Alaska . The manual produced will be approximately 20 pages in length and cover the current method used for effective quality control on State of Alaska asphalt projects, as well as the recommended most efficient contractor quality control measures to use on SOA asphalt projects. The da ta for this manual will come from interviews with relevant sources and self-conducted literature reviews. This project will begin on September 4th, 2014 and will be completed on May 1st, 2015.

Project Excludes
• The manual will not be an instruction manual on how to conduct asphalt quality control testing procedures • This project does not include a training program on the use of the manual or a hand-off document • There will not be a real world test on the effectiveness of the manual

1.3 Critical Success Factors

- Deliverables are completed and submitted on time
- Sufficient data is collected to complete manual
- Final PMP is approved by advisor and project sponsor

1.4 Assumptions

- The advisory committee will be available review all project documents and PPM's
- All deliverable can be completed by completion of PM686 class series
- The project manager will be the only resource assigned to work packages
- There is no funding associated with this project

1.5 Constraints

	Schedule	Scope	Cost
Fixed	X		
Somewhat Flexible		X	
Flexible			X

1.6 High Level Project Risks

Risk Register

ID #	Risk Name	Description of Risk	Likelihood	Impact	Risk Level	Response Type	Owner
External Risks (Conditions outside the control of the project)							
1.2.1.2.5	PMP	PMP not approved by Sponsor	Medium	High	High	Mitigate; Check in with sponsor throughout planning process	Sponsor
1.8.3, 1.6.1.2	Deliverable, final report	Computer Crashes	Low	High	High	Mitigate; back up all work to cloud	PM
1.4.1.2	Research	Alaska-Specific Data must be seen in-person	High	High	High	Accept; schedule trip to Alaska	PM
1.4.2.1	Research	Interviewees fail to schedule	Medium	Medium	Medium	Mitigate; keep in contact with interviewees	PM
1.4, 1.8.3	Project Execution, completion	Project manager becomes ill	High	Low	Medium	Mitigate; build schedule to finish early, when time is available work toward finishing critical tasks	PM
1.3, 1.5, 1.7, 1.8.3	Project Completion	Family Emergency of committee member or PM	Low	Low	Low	Accept; delay project if severe enough	Committee, PM
1.4.3.7	Deliverable	Committee members do not communicate on time	Medium	Low	Low	Mitigate; communicate early and often	Committee, PM

Risk Register

ID #	Risk Name	Description of Risk	Likelihood	Impact	Risk Level	Response Type	Owner
Internal Risks (Conditions within the control of the project)							
1.8.3	Project Completion	PM Defers	Medium	High	High	Accept; rebaseline	PM
1.4.2.2	Research	Lack of data	Medium	High	High	Mitigate; determine sources during planning phase, meet with UAA research librarians	PM
1.4.4.6	Execution	PM changes Manual sequencing	High	High	High	Mitigate; allow for extra time during manual writing process, follow change control process	PM
1.8.3	Project Completion	Project not complete on time	High	Medium	High	Mitigate; Use SPI as KPI, utilize comments from committee	PM
1.4	Project Execution	Project changes from deliverable based project to research based project	High	High	High	Mitigate; track risk with log, continued communicaiton with sponsor, keep interviewees on track with pre-determined quesitons	PM
1.8.3	Slippage	Project Manager does not prioritize time	Medium	Medium	Medium	Accept; crash tasks	PM
1.8.2	Project Completion	Project Manager takes vacation	High	Low	Medium	Mitigate; schedule built to accommodate planned vacations	PM
1.7	Closeout	Delay in Closeout	Low	Low	Low	Mitigate; collect lessons learned throughout execution process	PM

Section 2. Project Authority and Milestones

2.1 Project Oversight Authority

This project will be using an advisory committee consisting of 3 members. The advisory committee will serve as the project oversight authority.

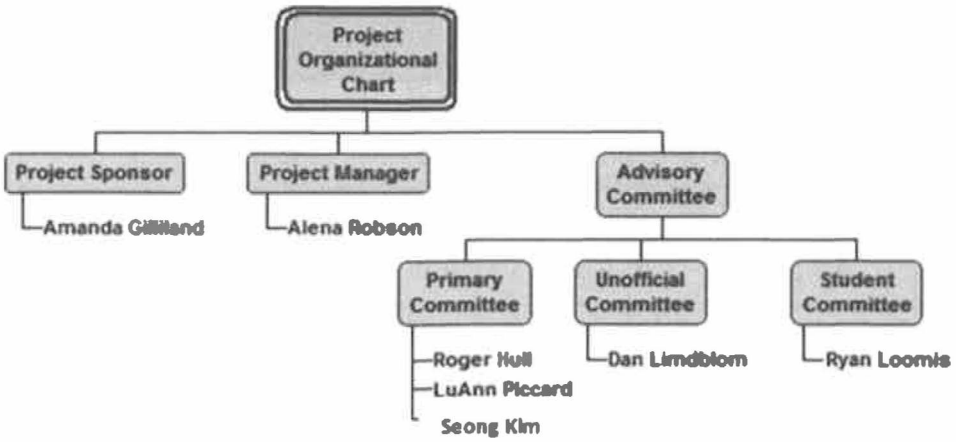
Advisory Committee Members		
Name	**Title**	**Organization**
Roger Hull	Primary Advisor	UAA Project Management
LuAnn Piccard	Committee Member	UAA Project Management
Seong Dae Kim	Committee Member	UAA Project Management

2.2 Projected Major Project Milestones

Milestone/Deliverable	**Target Date**
Project Start	9/4/14
Planning Complete	10/11/14
Presentation of PMP	12/1/14
Execution Complete	4/26/15
Presentation of Project Deliverables	4/27/15
Project Closeout Complete	4/30/15
Project Completion	5/1/15

Section 3. Project Organization

3.1 Project Structure



3.2 Roles and Responsibilities

Role	Responsibility
Project Manager	Manage project and complete all deliverables
Project Sponsor	Accept final project deliverables
Primary Advisory Committee	Advise project manager during all phases of project
Unofficial Committee	Advise project manager on validity of topic facts
Student Committee	Advise project manager when needed

3.3 Responsibility Matrix

Major Milestone	Project Manager	Project Sponsor	Primary Advisor: Hull	Committee Member: Piccard	Committee Member: Kim	Unofficial Committee: Lindblom
PPM 1	R	C	I	C	C	
PPM 2	R		I	C	C	
PPM 3	R		I	C	C	
PPM 4	R		I	C	C	
Presentation of PMP	R	C	I	I	I	
Project Execution: Phase 1	R		I	C	C	C
Project Execution: Phase 2	R		I	C	C	C
Project Execution: Phase 3	R		I	C	C	C
Project Execution: Phase 4	R		I	C	C	C
Final Presentation of Deliverables	R	C	I	I	I	I
Project Closeout	R	C	I	I	I	

R=Responsible C= Consult I= Inform

Section 4. Points of Contact

Role	Name/Title/Organization	Phone	Email
Project Manager	Alena Robson	907-420-7818	alenarobson@gmail.com
Project Sponsor	Amanda Gilliland/Quality Control Manager/ Knik Construction	907-545-7393	amandag@lynden.com
Primary Committee Advisor	Roger Hull/ UAA Faculty	907-786-1923	rkhull@uaa.alaska.edu

Section 5. Project Acceptance

Approval of the Project Charter indicates an understanding of the purpose and content described in this document. By signing this document, each individual agrees work should be initiated on this project and necessary resources should be committed as described herein.

Approver Name	Title	Signature	Date
Alena Robson	Project Manager		11/3/14
Amanda Gilliland	Project Sponsor		11/3/14
Roger Hull	Project Advisor		3 Nov 2014

Section 6. Revision History

Identify document changes.

Version	Date	Name	Description
1	9/8/14	Alena Robson, Project Manager	Project Charter Creation
2	9/30/14	Alena Robson, PM	Project Charter, Updated
3	11/3/14	Robson, Gilliland, Hull	Project Charter Signed
4	1/3/15	Alena Robson, PM	Updates to Project Charter

Contractor Asphalt Quality Control Measures on State of Alaska Projects

Project Manager- Alena Robson

UAA MSPM Capstone Project

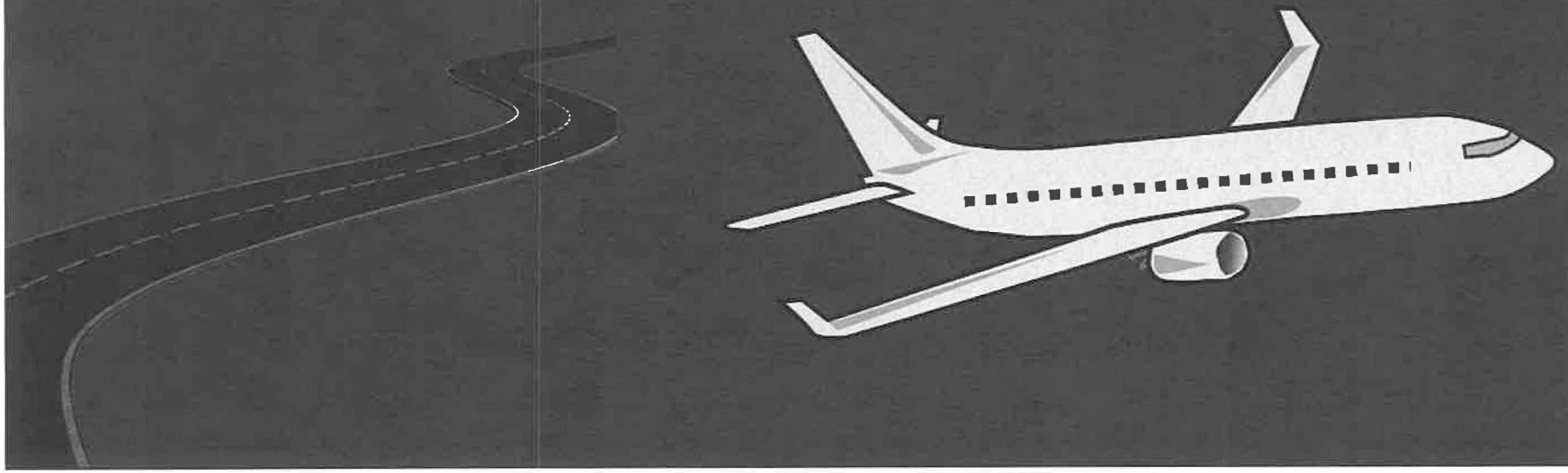
Spring 2015

Agenda

- Problem/ Opportunity
- Goal
- Project Overview
- Process
- Results
- Lessons Learned

Introduction to State of Alaska Projects

- The State of Alaska Department of Transportation and Public Facilities (DOT) funds construction projects all over the State of Alaska
- Focus on road and airports

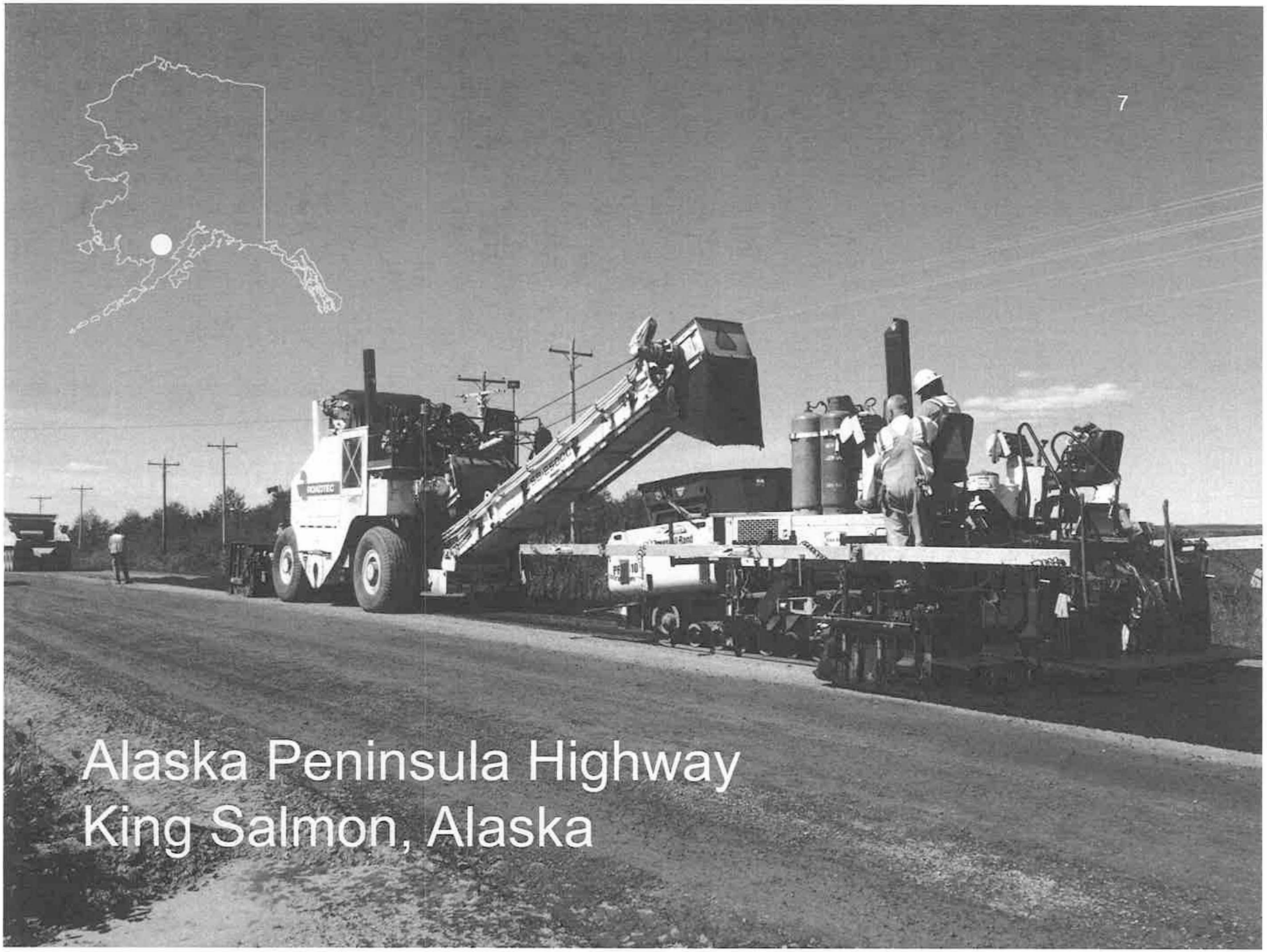


DOT Specifications for Asphalt Projects

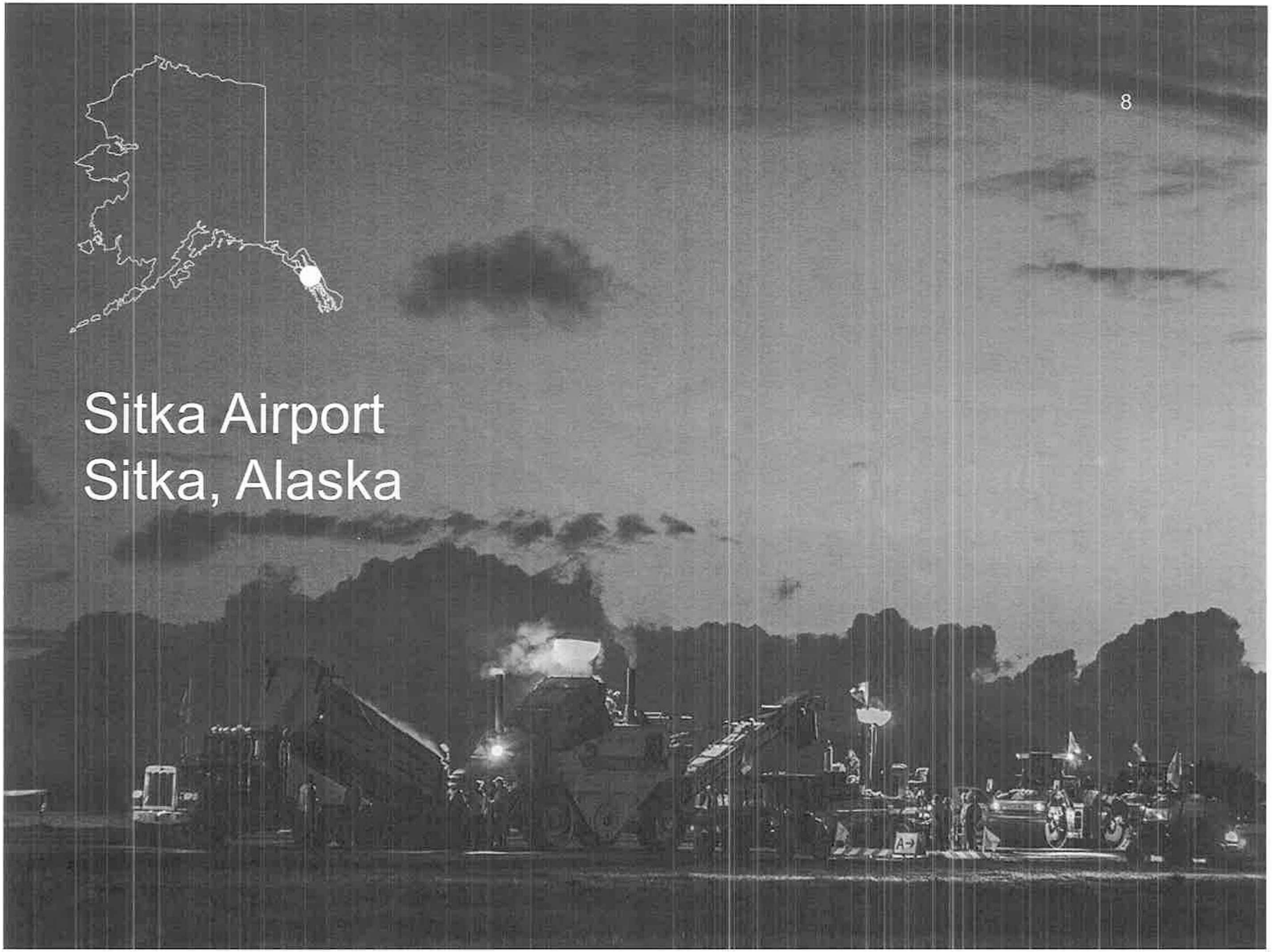
What is Asphalt Quality Control?

- Act of ensuring that a quality product will be delivered
- Conducted by the contractor
- Pertinent from early stages of each project through closeout


Why should YOU
care about quality control?



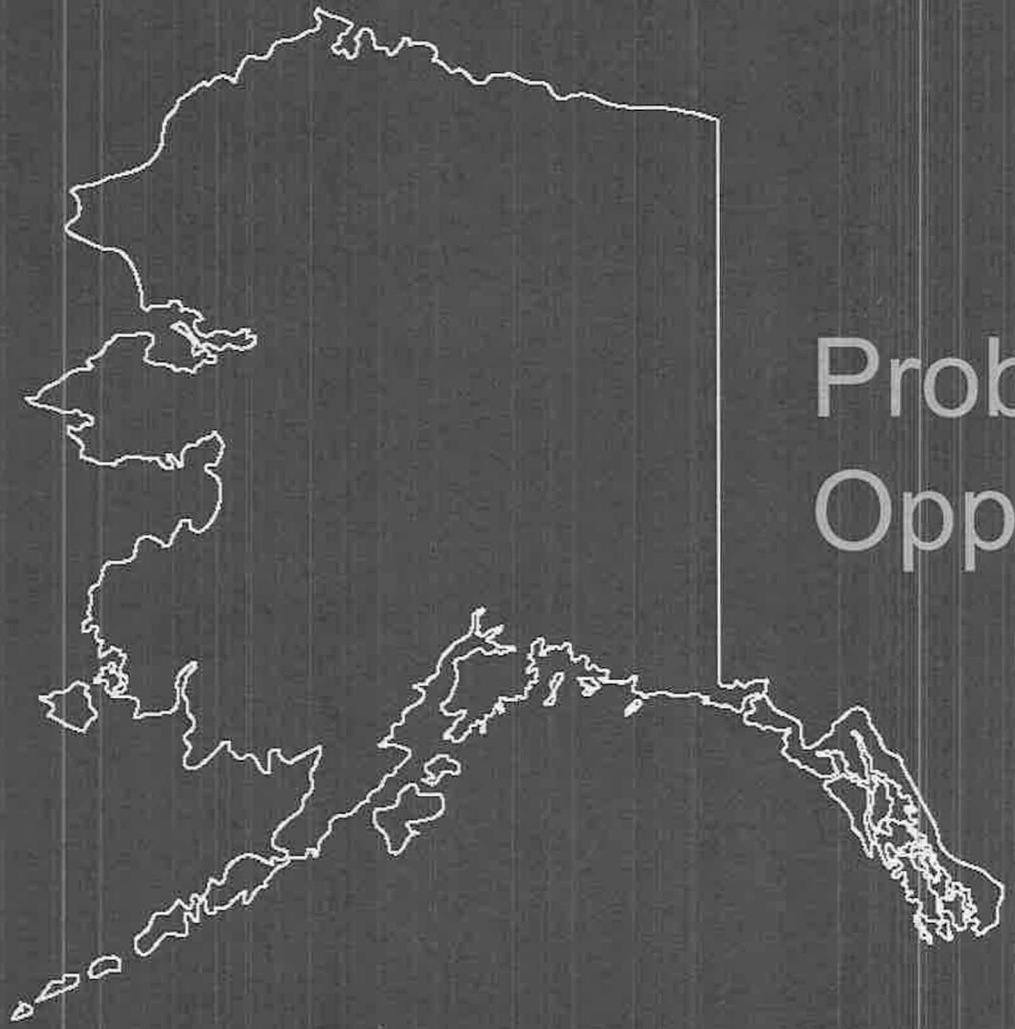
Alaska Peninsula Highway
King Salmon, Alaska



Sitka Airport
Sitka, Alaska

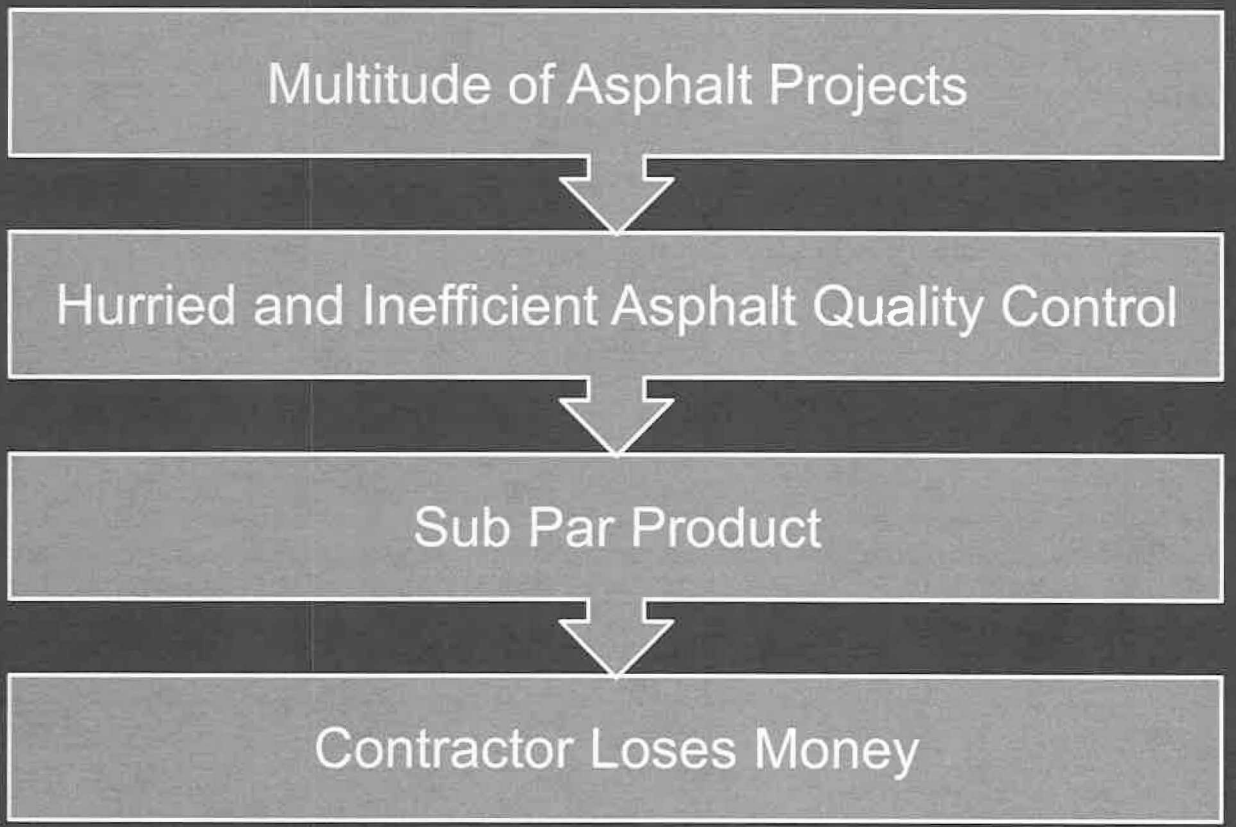
Why does the contractor care about quality control?

1. Money
2. DOT relations
3. Future projects lessons learned

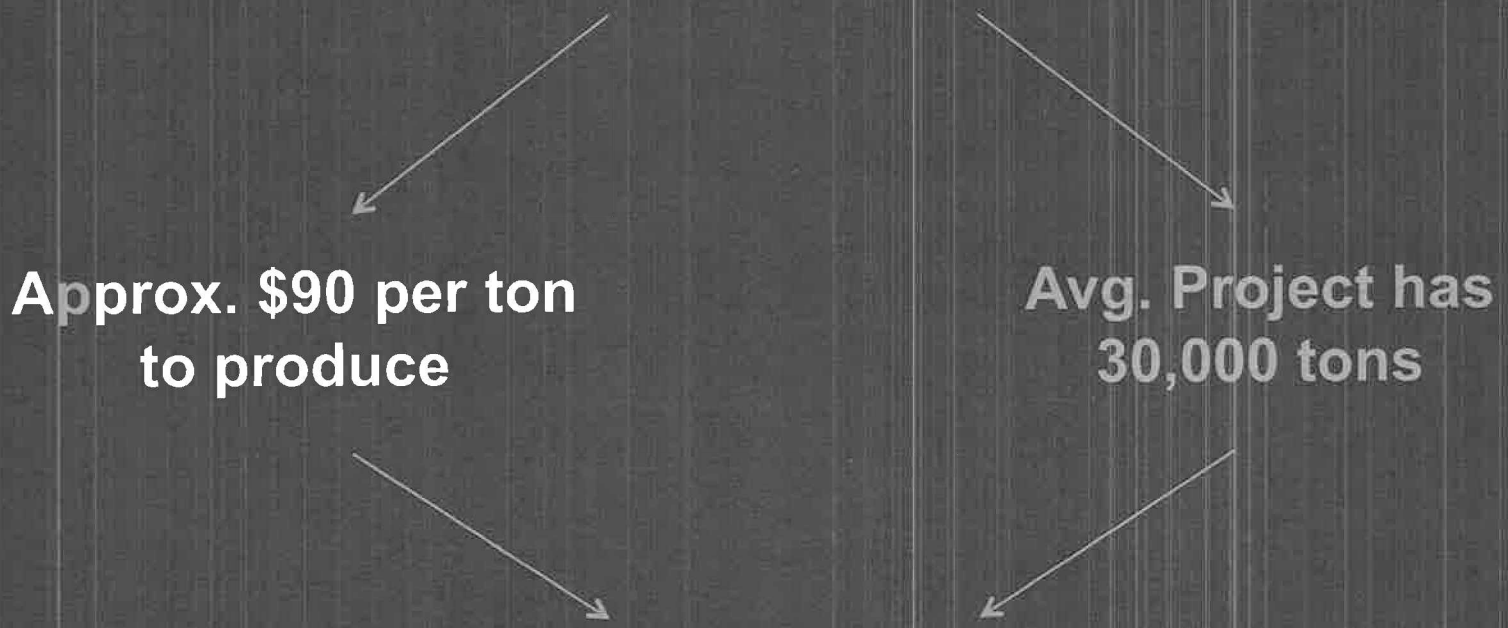


Problem / Opportunity

Problem/Opportunity



Asphalt Costs for Contractor (Typical Project)



Asphalt Costs to the State of Alaska

57425 – Steve Mielke

COMPILATION OF BIDS

STATE OF ALASKA – DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES – SOUTHEAST REGION

Federal No: NH-STP-0003(152)
(RE&S) No: 57425
Project Name: Wrangell Pavement Rehabilitation
Project Location: Wrangell

Opened at: 6860 Glacier Hwy., Juneau, AK
Date: 99801
By: Thursday, January 24, 2013
Bob Sanders

Certified True and Correct: Vanda Randolph 1/29/13 DATE, Contract Officer

Compiled By: VR___ Checked By: MR___

Order of Bidders Based on: Basic Bid

	State of Alaska DOT & PF Design Section Southeast Region	SECON P.O. Box 22379 JUNEAU, AK 99802 Phone:907-780-5140 Fax:907-780-5698	ASRC CIVIL CONSTRUCTION, LLC 1211 EAST 80TH AVENUE ANCHORAGE, AK 99515 Phone:907-334-6704 Fax:907-334-5410	KNIK CONSTRUCTION COMPANY, INC. 6449 SOUTH ARCTIC PLACE, STE 1 ANCHORAGE, AK 99502 Phone:907-245-1665 Fax:907-245-1744
Basic Bid	ENGINEER'S ESTIMATE	LOW BIDDER	BIDDER 2	BIDDER 3

Line No. / Description / Quantity / Per Unit	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
201(1) Removal Of Structures And Obstructions								
All Required Lump Sum	L.S.	2,000.00	L.S.	20,000.00	L.S.	6,504.00	L.S.	7,800.00
202(2) Removal Of Pavement								
1,680 Square Yard	8.00	14,400.00	5.00	9,000.00	30.00	54,000.00	11.80	19,824.00
202(5) Removal Of Sidewalk								
230 Square Yard	30.00	16,500.00	14.00	3,300.00	30.00	3,300.00	11.80	3,630.00
202(4) Removal Of Culvert Pipe								
1,726 Linear Foot	15.00	25,890.00	10.00	17,260.00	30.00	17,260.00	13.00	22,438.00
202(5) REMOVAL OF CURB AND GUTTER								
25 Linear Foot	20.00	500.00	10.00	250.00	20.00	500.00	20.00	500.00
202(23) Storm Drain System Cleaning								
All Required Lump Sum	L.S.	40,000.00	L.S.	110,000.00	L.S.	110,000.00	L.S.	75,000.00
203(1) Unclassified Excavation								
500 Cubic Yard	20.00	10,000.00	30.00	15,000.00	25.00	12,500.00	30.00	15,000.00
203(5A) Borrow, Type A								
1,500 Ton	18.00	27,000.00	25.00	37,500.00	35.00	52,500.00	25.00	37,500.00
301(3) Aggregate Base Course, Grading D-1								
360 Ton	38.00	13,680.00	50.00	18,000.00	35.00	12,600.00	25.00	9,000.00
202(2) Linear Grading								
1,284 Station	38.00	84,260.00	100.00	128,400.00	55.00	70,620.00	100.00	128,400.00
401(1A) Asphalt Concrete, Type II, Class D								
29,025 Ton	95.00	2,686,750.00	75.00	2,221,875.00	70.00	2,073,750.00	84.00	1,896,800.00
401(1B) Asphalt Concrete, Type III, Class D								
4,510 Ton	120.00	527,204.00	55.00	223,250.00	65.00	293,150.00	67.00	302,170.00
401(2) Asphalt Cement, Grade PG 58-28								
1,000 Ton	1,000.00	1,000,000.00	950.00	1,000,000.00	1,000.00	1,000,000.00	1,000.00	1,000,000.00
401(9) Asphalt Price Adjustment								
All Required Contingent Sum	C.S.	191,800.00	C.S.	191,800.00	C.S.	191,800.00	C.S.	150,000.00
401(10) Asphalt Material Price Adjustment								
All Required Contingent Sum	C.S.	50,000.00	C.S.	50,000.00	C.S.	50,000.00	C.S.	50,000.00
402(1) STC-1 Asphalt For Tack Coat								
132 Ton	1,200.00	132,000.00	1,500.00	228,000.00	1,100.00	167,200.00	1,800.00	237,600.00
404(1) Pavement Cold Planing								
27,800 Square Yard	8.00	222,400.00	5.00	139,000.00	3.50	97,300.00	5.00	83,400.00

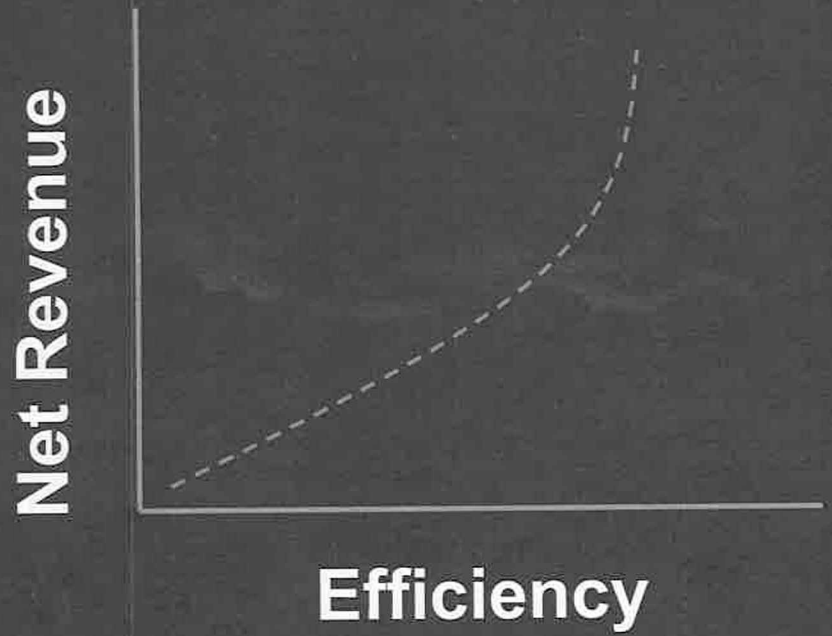
Aggregate

401(1B)	Asphalt Concrete. Type III: Class B				
	4,310 Ton	120.00	517,200.00	75.00	323,250.00
401(2)	Asphalt Cement. Grade PG 58-28				
	1,990 Ton	1,000.00	1,990,000.00	950.00	1,890,500.00

Oil

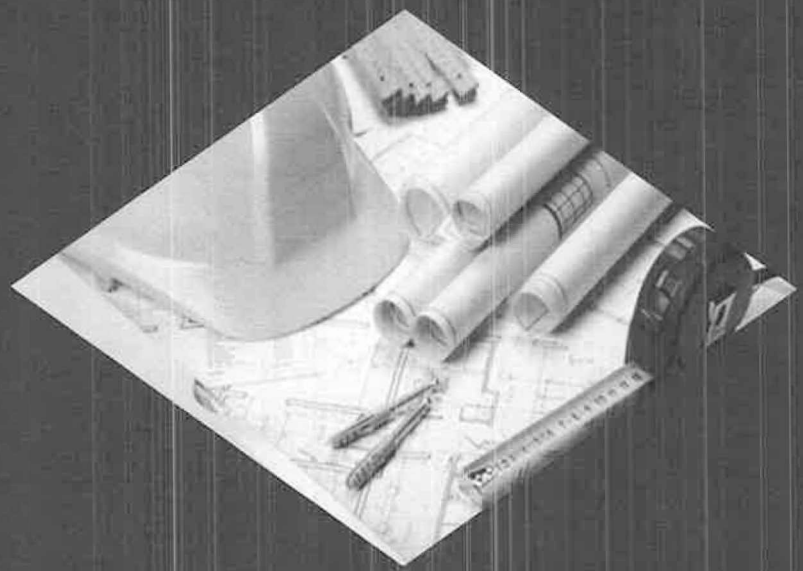
Total Cost per Ton:
$1025

Business Goal

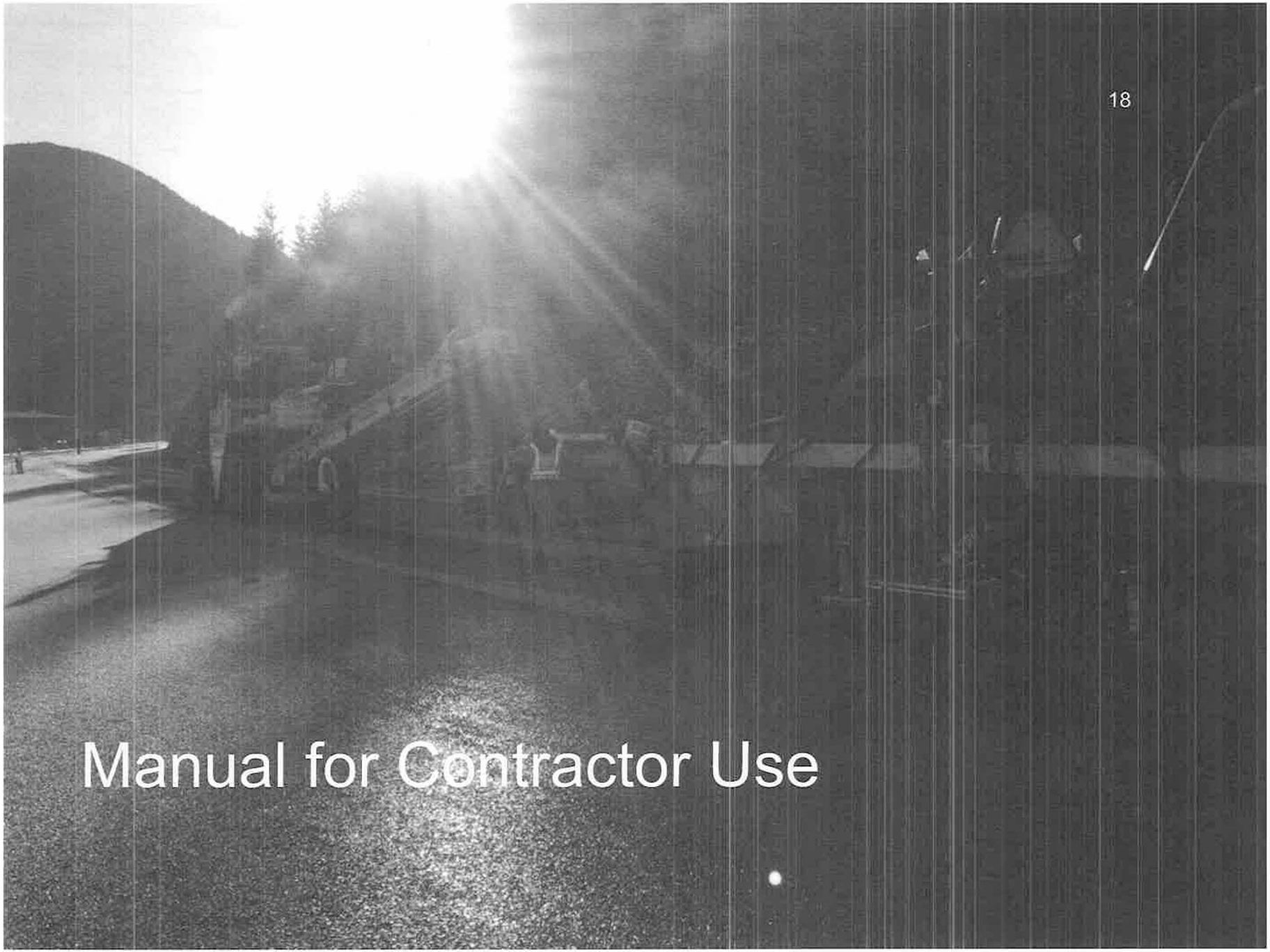


Project Objectives

- Minimize financial and schedule risks
- Define specific improvements
- Increase overall efficiency, maintain DOT standards



Solution?

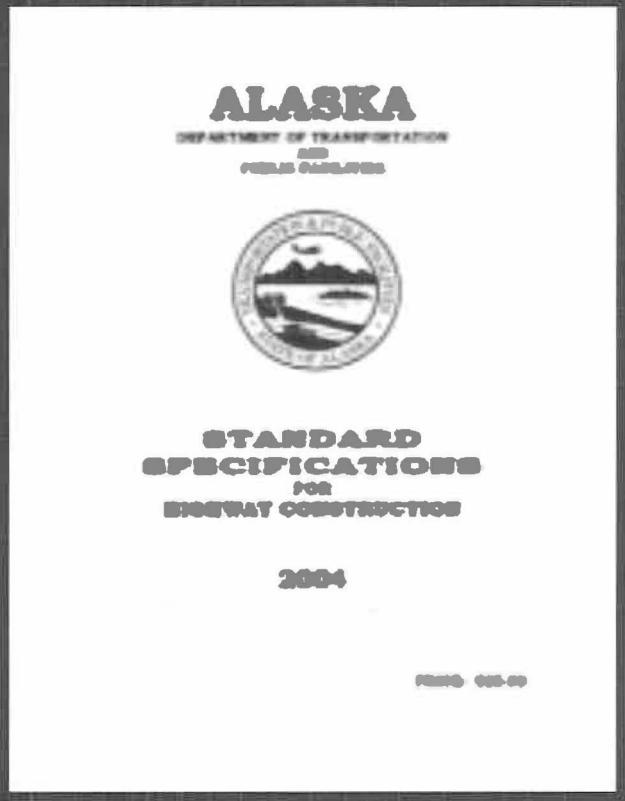


Manual for Contractor Use

Basis of Manual

- Introduction
- Current Quality Control Methods
- Project Initiation, Bidding Process and Preconstruction
- Project Execution, Paving Phase
- Project Closeout
- Final Recommendations

Literature Review



Alaska Standard Specifications for Highway Construction

Created a pathway to identify possible improvements

Literature Review

QUALITY CONTROL-QUALITY ASSURANCE
IMPACT ON ASPHALT PAVEMENT

By

Khaled A.M.S.M. Al-Tarkeet

A thesis

submitted to the Department of Civil and Architectural Engineering and The Graduate School of the University of Wyoming in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

CIVIL ENGINEERING

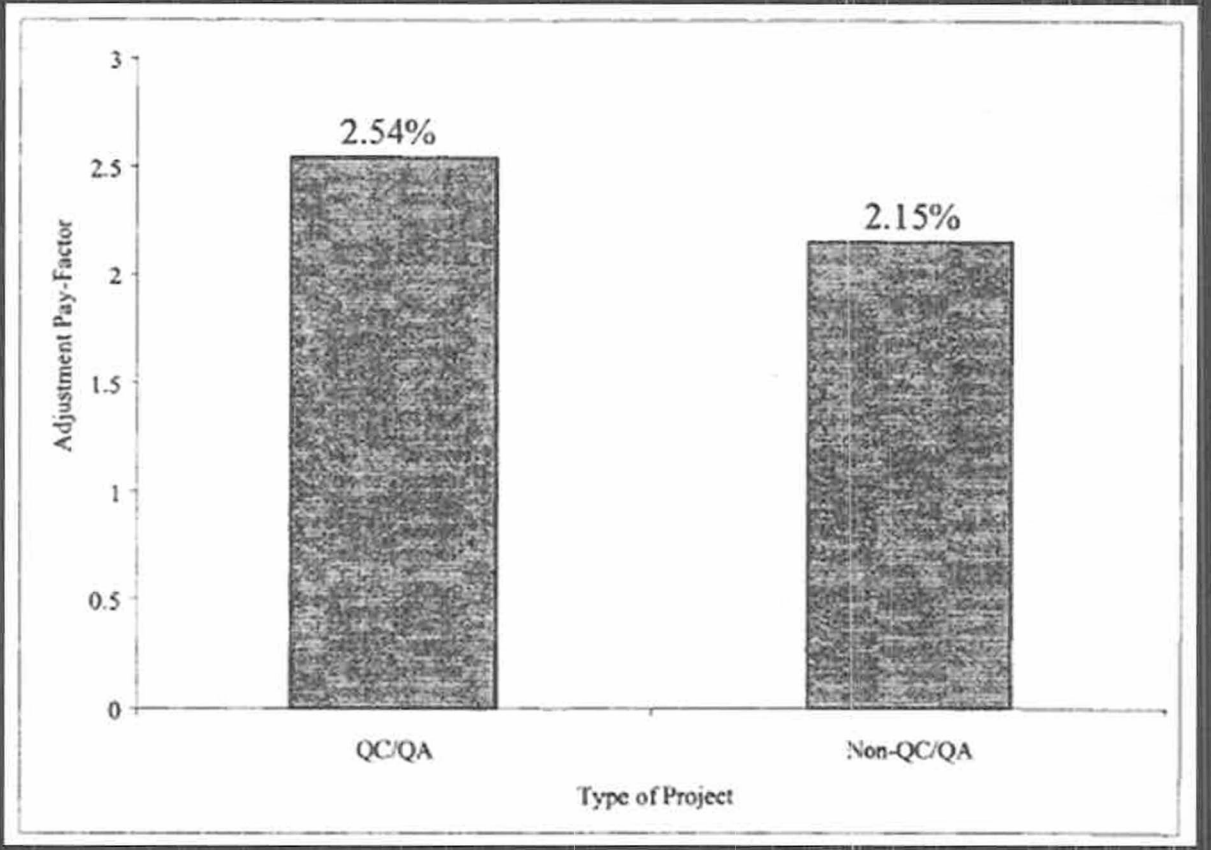
Laramie, Wyoming

December, 2002

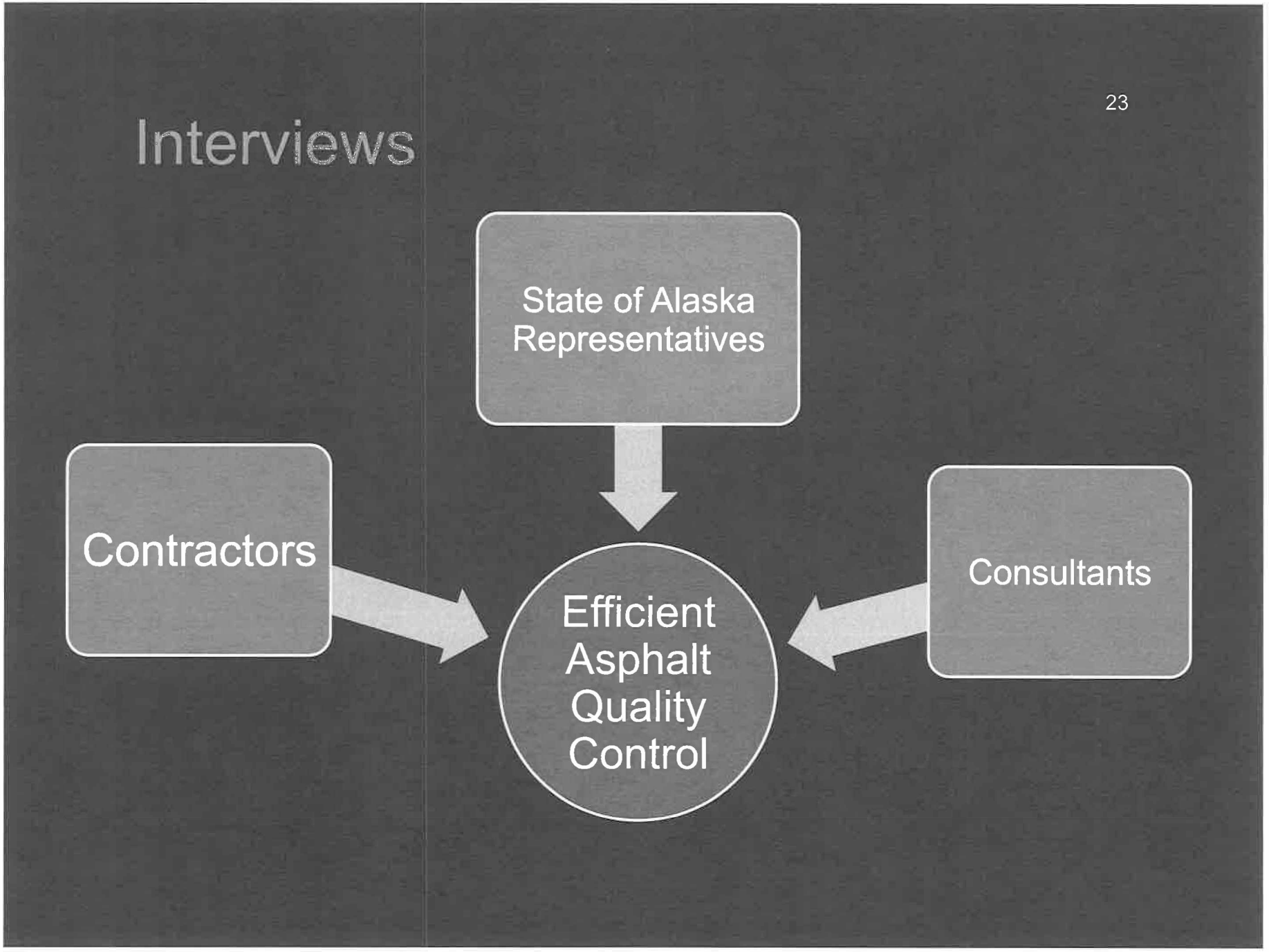
Quality Control-Quality Assurance Impact on Asphalt Pavements

Build a foundation for stakeholders

Literature Review

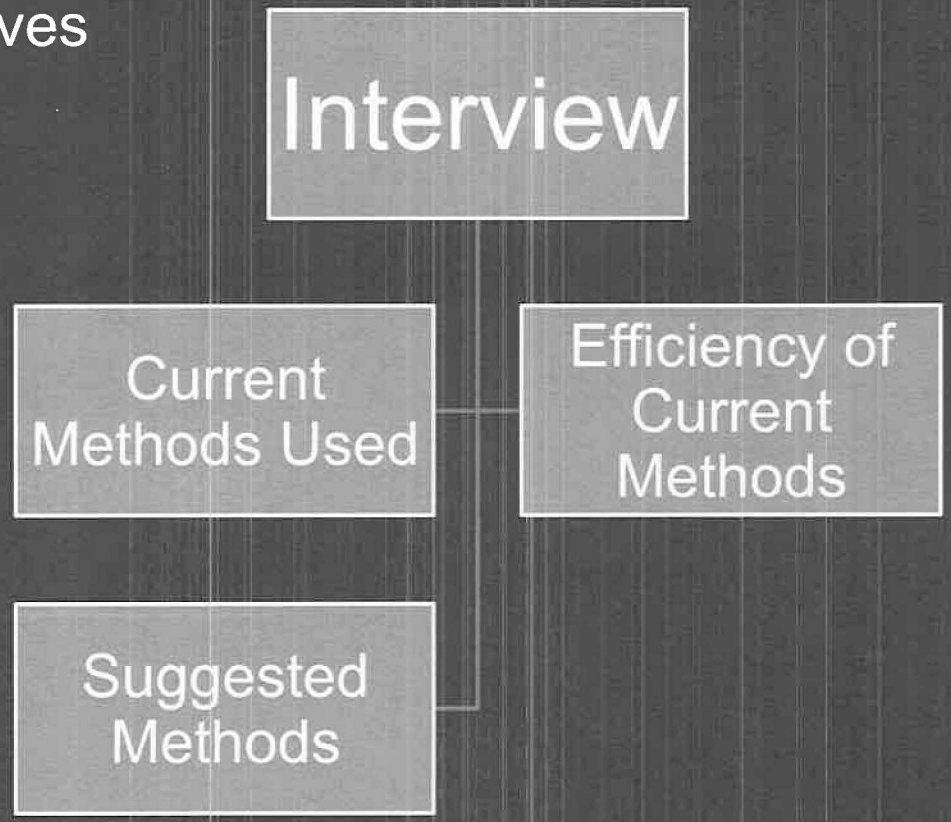


Interviews

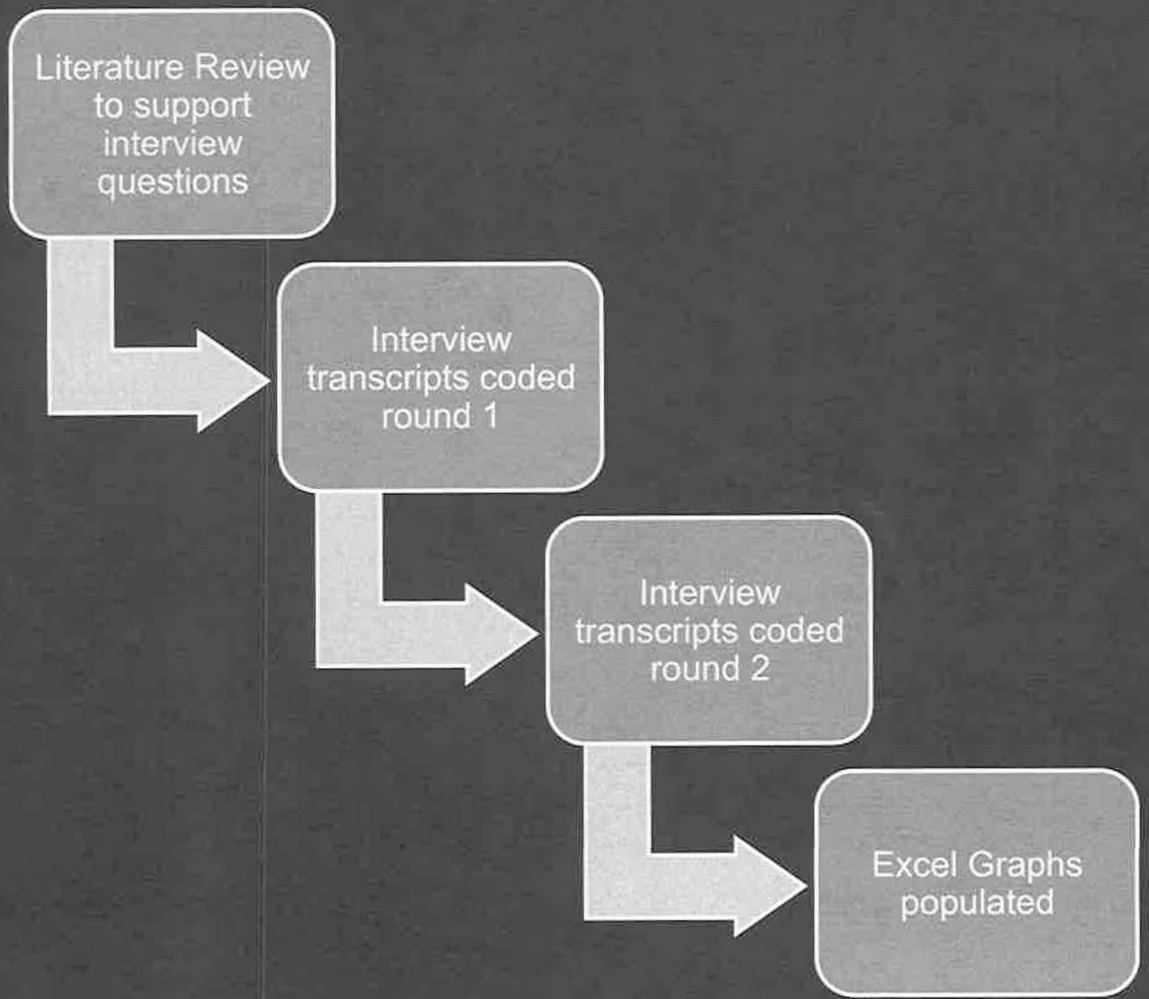

State of Alaska Representatives
Contractors
Consultants
Efficient Asphalt Quality Control

Basis of Interviews

- 5 contractor representatives
- 3 Consultant representatives
- 3 State of Alaska Representatives



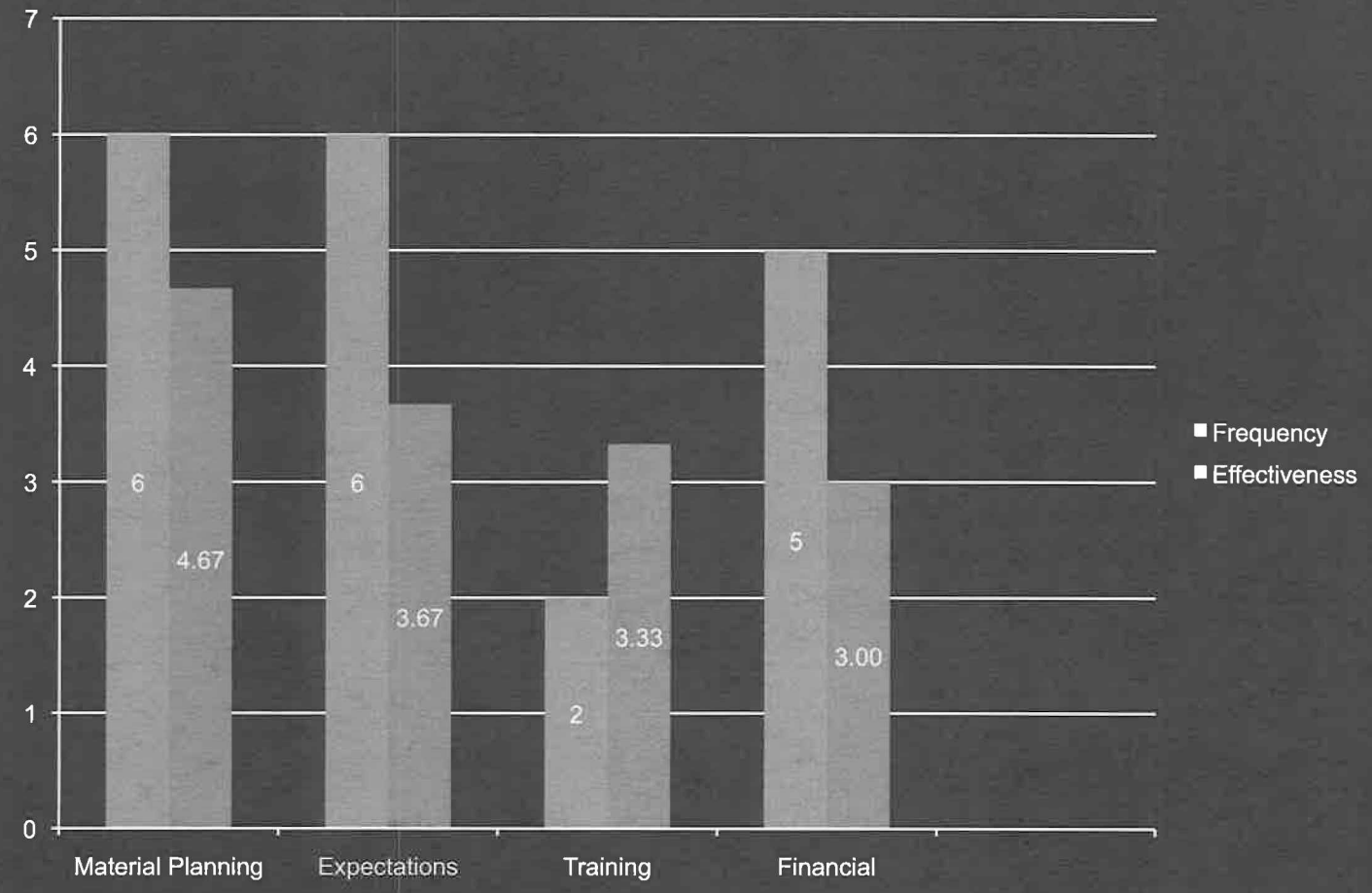
Data Analysis



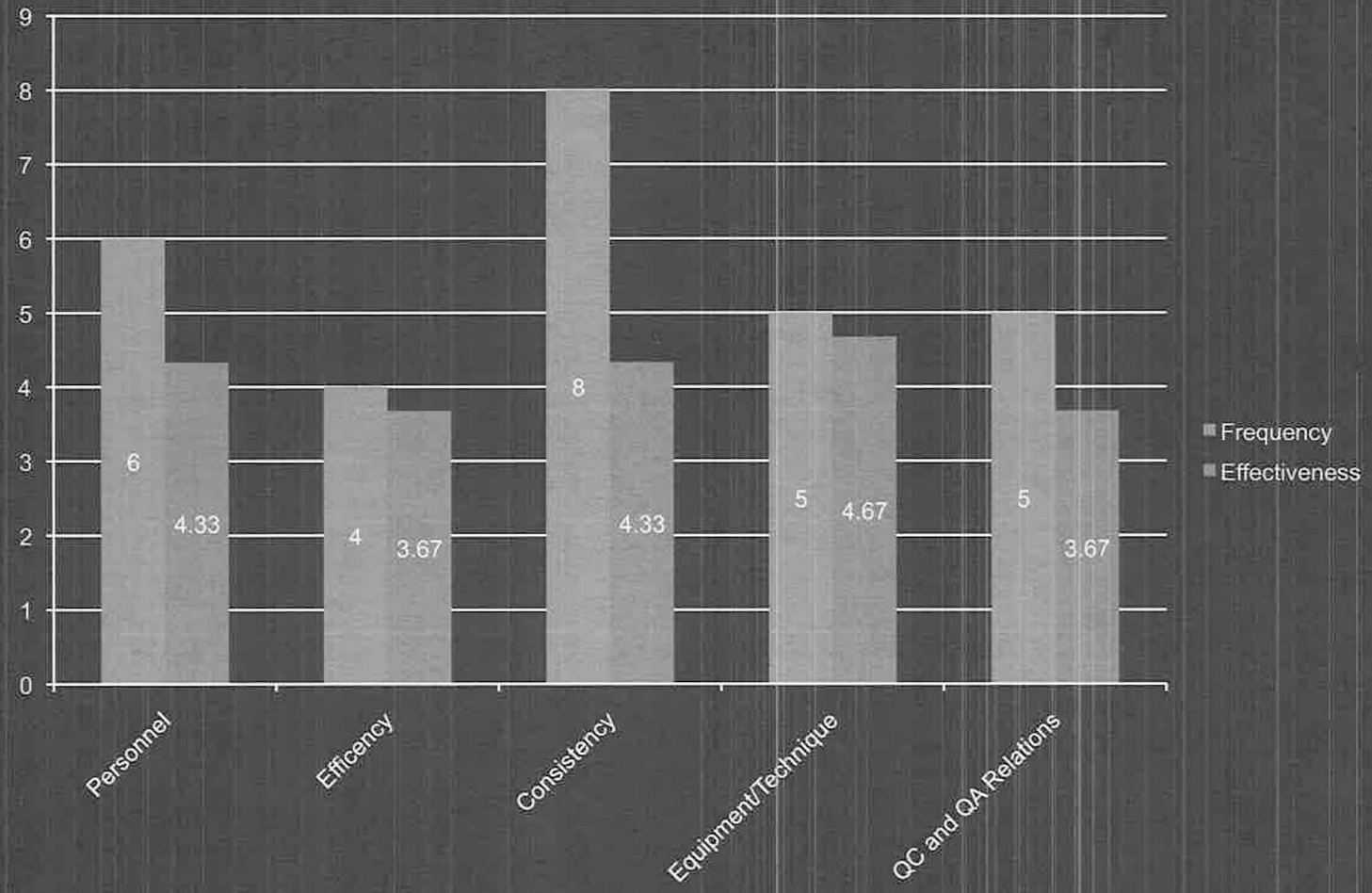
Data Analysis Tool: Microsoft Excel

- 3 graphs
  - Preconstruction
  - Execution
  - Closeout
- Method discussion frequency
- Effectiveness of each method

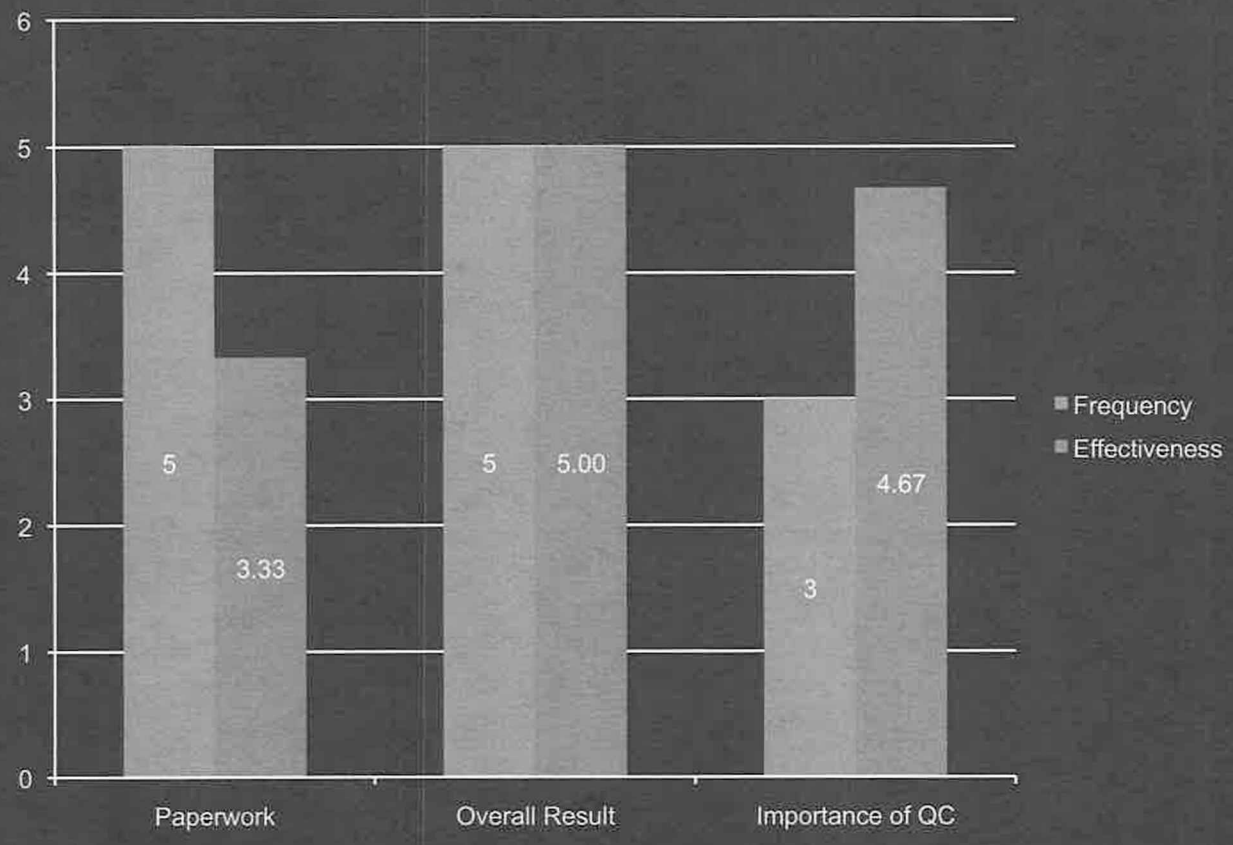
Preconstruction



Execution


9
8
7
6
5
4
3
2
1
0
6
4.33
4
3.67
8
4.33
5
4.67
5
3.67
Personnel
Efficency
Consistency
Equipment/Technique
QC and QA Relations
Frequency
Effectiveness

Closeout


6
5
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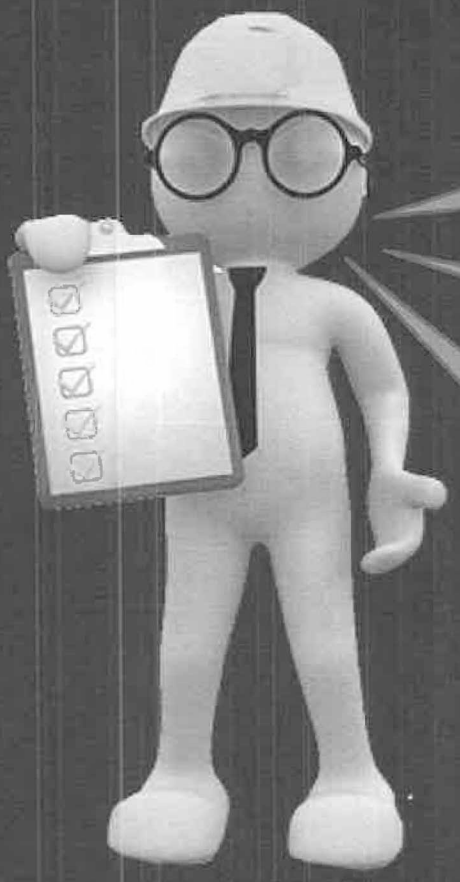
3
4.67
Paperwork
Overall Result
Importance of QC
Frequency
Effectiveness

Final Recommendations



Preconstruction

Execution

Closeout

Future Research: Best QC Practices for all materials

Material testing for all materials

Separate project that supports all types of material quality control

Often the sub-base material, base course material, shouldering material, etc., plays a significant role on road and airport jobs

Future Research: A Focus on Execution

- The current project did discuss how to improve effectiveness during the execution phase, but much was left desired.
- Techniques used during execution
- Using Quality Control as a financial stability tool during execution

Lessons Learned

- Topic Choice is pertinent to project success
- Committee members are a valuable asset
- Open communication with project sponsor
- Continual progress towards deliverable yields desired KPI's

Questions?

Contractor Quality Control

A Manual to Improve Efficiency in Contractor-Supplied Quality Control on Asphalt Heavy Civil Construction Projects on State of Alaska-owned Roads